

AMERICAN
RAILROAD JOURNAL.

STEAM NAVIGATION, COMMERCE, FINANCE,

INSURANCE, BANKING, MINING, MANUFACTURES.

HENRY V. POOR, *Editor.*

SATURDAY, MAY 21, 1859.

Second Quarto Series, Vol. XV., No. 21.---Whole No. 1,205, Vol. XXXII.

ESTABLISHED IN 1831.

NEW-YORK:

PUBLISHED WEEKLY, BY

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[WHOLE No. 1,205, Vol. XXXII.]

MESSRS. ALGAR & STREET, No. 11 Clements Lane, Lombard Street, LONDON, are the authorised European Agents for the *Journal*.

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American Railroad Journal.

PUBLISHED BY J. H. SCHULTZ & CO. No. 9 SPRUCE ST.

New York, Saturday, May 21, 1859.

The Grand Falls, N. B., Bridge Disaster—To what was It Due?

In the RAILROAD JOURNAL of the 14th inst., appears a description of the general features of a bridge erected across the St. John River, at Grand Falls, New Brunswick, together with an account of its failure on the 18th of December last, just 18 days after it was opened for travel.

This disaster has not attracted that attention among engineers which the inferences or conclusions fairly deducible from it demand. The failure was not simply that of an unimportant road bridge, involving merely the strength of a wooden stringer, but was of such a nature as to involve the whole question of the applicability of iron in all such structures, where its tensile strength is used under the low temperatures of our northern latitudes.

Since reading the description referred to, I have examined the detailed specifications of the bridge, as published in the report of the Board of Works for New Brunswick, for the year 1857, so that but little difficulty exists in accounting for the failure. Although the description you publish does not agree with the official specification in respect to the dimensions of some of the parts, yet it is sufficient to give a correct idea of the

principle upon which the bridge was constructed, and I refer to that description in order that I may be understood without a repetition, giving only such dimensions as were omitted, or erroneous. The plan is simply a wooden *Howe* truss, 7 feet high, with a cambre of 5 feet at the centre, spanning an opening 190 feet wide—the truss being supported at intervals by *trestles* resting upon wrought iron chains hung from side to side of the opening, and having a *versed sine* of 15 feet at the centre. These chains had a section of 18 inches in the aggregate at the centre, and 20 inches at the ends. They were anchored to the back of the abutments, and were also connected to the ends of the bridge, so that the trusses served as *struts* or straining beams, to resist the tension of the chains. The bridge, it is stated in the article referred to, failed under a moving load of one ton! and a distributed load at rest, consisting of one foot of snow, estimated to weigh 20 tons.

Since the accident, a report upon the cause of the failure has been made, at the request of the Board of Public Works, by R. W. Burrowes, Esq., C. E., which I have now before me. He gives the same statement in respect to the moving load, but says nothing of the 20 tons of snow. He speaks, also, of the bridge having been subjected to a moving load, on the day of its opening, equal to 13½ tons, and concludes, from the fact that the bridge failed under a load of one ton, while it stood under a load of 13½, that there was no "direct defect of materials or workmanship." I infer from this, either that your published description must be wrong in respect to the snow, or that there was an equal amount of snow in both instances. If the latter was the case, it seems very strange that Mr. Burrowes' calculations should not have taken it into account. That he did not, is rendered quite certain from his estimate of weight of bridge and load, which he makes 120,334 lbs. From careful computations of the bills of materials, I make the weight of the structure between the faces of the abutments, excluding all that portion of the bridge and chains immediately on them, and including the *moving* load, about 109,000 lbs.

Mr. Burrowes' estimate probably included those portions of the trusses and chains which

mine excludes, and therefore the two agree, very nearly.

I quote Mr. Burrowes:

"In a calculation of a tensile resistance to fracture, of 50,000 lbs. per square inch, and a general distribution of load, the chains should have sustained a weight of 666,666 lbs.

"The resisting force of truss to upward pressure, taking into consideration the cambre, (five feet,) together with the anchorage on abutment and pier, should have been equal to 481,023 lbs. Add to this, the weight of structure itself, 120,334 lbs., making the whole resisting force to contraction of chains equal to 601,357 lbs."

All this is not very clear, but I suppose he means that the stiffness and weight of the structure should have given way, and the whole have been lifted up in the centre by such a contraction of the chains as would have produced a tension of 601,357 lbs., and that they should have been able to bear a tension of 666,666 lbs. Instead of lifting up the trusses, as should have been the case, the chains parted, and trusses and all fell into the river.

I again quote Mr. Burrowes:

"It must be apparent to an observing mind, that a combination of materials, affected so materially by temperature, placed in positions where they are supposed to act *equally and simultaneously as resistants to a transverse strain, must be erroneous.*" These remarks relate to a combination of a rigid wooden truss, and an *iron suspension*. The effect of difference of temperature being in the one case immaterial, whilst on the other, with a chord of 190 feet, and a *versed sine* of 15 feet, and length of arc equal to 193.12 feet, and a difference of temperature of +100° and -30°, the contraction of the chain will be equal to .19 of a foot, and a diminution of the *versed sine* and consequent *vertical strain upon the truss equal to 50 feet.*"

All this (italicised by myself) is hardly as clear as the other remarks quoted; but I suppose, where he says *transverse strain*, he means something entirely the reverse, viz., *longitudinal strain*, and that by his figures he means that the chains being 193.12 feet long between the abutments, as they hang, would contract .19 of a foot under a temperature of -30°, and that this con-

traction would flatten the curve 6 inches. Either the truss must bend upward 6 inches, or the chains must part.

I quote from Mr. Burrows further:

"From calculations I have made, the truss, without the auxiliary suspension chains, should have sustained a greater load than it was taxed with at the time of the accident; it is also *probable* that both chains should have broken *simultaneously*." I will be able, I think, to show that, although Mr. Burrows himself made the calculations, the truss would *not* have sustained itself and the snow, even without the load of one ton. The italics again are mine, and in this case I will not venture to guess at what is meant.

The elements with which we have to deal are as follows:

Clear span between supports.....	190 feet.
Height of truss.....	7 "
Upper chord (one stick 7×12, one stick, 9×8) area.....	156 sq. inches.
Lower chord (one stick 10×10, one stick 8×10) area.....	180 "
Cambre.....	5 feet.
Area of chains, aggregate at centre.....	18 inches.
" " " " at ends.....	20 "
Length of chains from anchorage to anchorage.....	226 feet.
Versed sine of do.....	15 "
Highest summer temperature.....	+100°
Temperature at time of failure.....	— 30°

The specification called for the *best hammered* iron for the chains; hence they should have had a maximum strength of 60,000 pounds per square inch, but there is no account of any test having been applied to them before they were used.

Weight of bridge and load was as follows:

Timber and iron between abutments.....	105,888 lbs.
*Snow, 17 ft. wide, 200 ft. long, 1 foot deep, say.....	44,800 "
Horse, sleigh and men.....	2,250 "
Total weight.....	152,938 "
Equivalent weight at middle, say.....	77,000 lbs.
Half span of truss between supports.....	95 feet.
Versed sine.....	5 "
Exterior secant of arc.....	5 "

Then—as 10 ft.: 95 ft.: $\frac{77,000}{2}$: 365,750 lbs. = the horizontal thrust of the trusses at the abutments.

On the supposition that this horizontal thrust is counteracted by tension on the cables, that tension at the ends where they were connected, will be found as follows:—

Half span as before.....	95 feet.
Versed sine of cable.....	15 "
Exterior secant of do.....	15 "
Hypotenuse $\sqrt{95^2 + 30^2}$	99.62 "

Then as 95 ft.: 99.62 ft.: 365,750 lbs.: 383,430 lbs. = the tension on cables produced by sustaining the thrust of the bridge and load. The whole sectional area of the cables at the points where they failed, near the abutments, being 20 square inches, it follows that they were subjected to a strain of only 19,171 lbs. per square inch for this duty. Now if the truss had been free to bend upward in the centre, no contraction of the chains, in consequence of the extreme temperature, would have subjected them to any greater tension. The chains would still only have had to perform the same duty, viz,

*I have here assumed the same weight as is assumed in the description of the accident before referred to; but the depth stated would not give half this weight.

to have sustained the trusses and load. But if the trusses were fastened to the chains at their ends, as stated, (it does not appear clearly how); and if the trusses had a certain degree of stiffness, the next calculation is the extent of that stiffness, and the additional amount of tension produced upon the chains in bending the trusses upward at the centre, to the extent to which the versed sine of the chains was lessened by their contraction. I assume that every part of the structure was in adjustment at a temperature of +100°.

The entire length of the chains between anchors was 226 feet. The contraction due to a change of 130°=0.00088 ft. per foot. Then the whole contraction must have been 0.1988; or say 0.2 of a foot, in the whole length of chains.

The arc of a circle having a chord of 190 feet and a versed sine of 15 feet, will be 193.19 feet in length. If the arc be reduced in length to 192.9 feet, (which was the case), by the contraction of the chains, the chord remaining the same, the arc will be flattened and the versed sine reduced to 14.36 feet, a difference of 7½ inches. To this extent, then, the trusses must be bent upward.

Supposing each of the trusses to have been in one solid beam of white pine, 7 feet deep and 10 inches thick, the weight required to produce a deflection of 7½ inches in the middle, is found as follows:—

$\frac{84 \times 84 \times 84 \times 10}{190^2 \times 0.0077} = 21,320$ lbs. They were not solid, of course, but the whole space between the top and bottom chords was filled up by braces having no strength in themselves, but only serving to bring the top and bottom in play; therefore, the strength of a solid beam of the depth of this space, and 10 inches thick, should be deducted. The distance between the chords was 50 inches; then $\frac{50 \times 50 \times 50 \times 10}{190^2 \times 0.0077} = 4,500$ lbs., which being deducted from 21,320 lbs. leaves 16,820 lbs. as the weight; or (reversing it), the lifting pressure applied at the centre necessary to bend one of the trusses upward 7½ inches, supposing the top and bottom chords to have been of solid timber for their whole length and depth, and that the intermediate braces and bolts had strength sufficient to bring the whole capacity of the chords into use. But the chords are made up each of *two* thicknesses in depth, and having several splices in their length, and their value for stiffness would be no more than one-half that of solid timber—consequently, 8,410 lbs. upward pressure would have bent one of the trusses 7½ inches; or 16,820 lbs. in all was the increased load upon the cables due to the stiffness of the trusses. The additional tension upon chains is found as follows:—

Half span as before.....	95 feet.
Versed sine of cables reduced to.....	14.36 "
Exterior secant do.....	14.36 "
Hypotenuse $\sqrt{95^2 + 28.72^2}$	99.3 "

Then as 28.72 feet: 99.3 feet: $\frac{16,820}{2}$ lbs.: 29,077 lbs. = tension upon cables due to stiffness of trusses.

The tension due to weight of bridge and load being 383,430, the total strain under the reduced temperature is 412,507 lbs., or 20,625 lbs. per square inch, which was the *greatest possible* strain to which the chains could have been subjected at the time they broke. In these calculations every allowance has been made in favor of the bridge. The weight of load is taken at 20 tons, when it was not probably 10 tons, and if we are to be guided entirely by Mr. Burrows's report, it was only 1 ton. It has been assumed that the anchorage of the chains shared none of the strains, but that the whole was sustained by the connection at the ends of the trusses.

If before contraction of the chains took place, the anchorage in the back of the abutments shared in sustaining the tension, then it follows, that the instant contraction took place the trusses were relieved; for a certain amount of this contraction must have been between the ends of the trusses and the anchors, so that the strain upon the chains would have been that due simply to the weight and stiffness of the bridge acting vertically, and not by thrust.

In this case, the tension upon the chains would have been as follows:—

Half weight of bridge and load.....	76,469 lbs.
Required at centre to raise the bridge 7½ inches.....	16,820 "
Total weight at centre.....	93,289 lbs.

Then as 28.72 is to 99.3:: $\frac{93,289}{2}$ lbs.: 161,216 lbs. = to 8,061 lbs. per square inch of cables.

This is most probably the extent of the strain, under which the cables failed.

It is stated by Mr. Burrows, that the trusses should have sustained the load without the aid of the chains. I have already shown that a weight of 16,820 lbs. at the centre in addition to the weight of the chords, would produce a deflection of 7½ inches—or adding ½ weight of chords, say 15,000 lbs., 31,820 lbs. at centre would deflect the bridge this amount. Now the weight of the bridge and load, excluding the suspension chains and trestles, was about as follows:—

Trusses and planking.....	90,000 lbs.
Snow as assumed.....	44,800 "
Sleigh, horse and men.....	2,250 "

Equivalent to a load on middle of... 137,050 lbs.
Then: 31,820 lbs.: 7.66 inches:: 68,525 lbs.: 16.6 inches = deflection produced upon the bridge by its own weight and the load. That this strain would have broken the bridge beyond a doubt is shown by the following calculation of the tension upon the lower chord. The compression upon the upper chord would have been equal.

Height of truss, centre to centre of chords, 5.6 ft.	
Half span.....	95 ft.
Then 5.6 : $\frac{68,525}{2}$:: 95 : 58,1230 lbs. = tension	

on lower chord. As the strength of the lower chord is that of the weakest part, and as it is made of two sticks spliced, the available area for tensile strength is that of the smallest stick. This was 8+10=80 sq. inches area. By the insertion of two 1½ inch bolts through its entire depth, it had 25 square inches of its section cut away, reducing it to 55 square inches, not taking into consideration the weakening at the splices. Taking the two chords together we have 110 square inches of section to resist a tension of 581,230 lbs.; or 5,234 lbs. per sq. inch, or nearly as much as the chains were subjected to at the time of their failure. The utmost limit of tensile strain to which it is considered *safe* to subject pine is about 2,000 lbs. per sq. inch. The chords of this bridge, with

out the chains, were subjected to more than $2\frac{1}{2}$ times the strain which they should have been to have sustained the structure beyond risk, even if the lower chords had not parted by tension, the compression upon the upper chord, slightly braced laterally as it was, would have collapsed the whole structure like an egg shell. It is not therefore at all surprising that, when the chains parted, and the trusses were subjected to their weight in addition to their own, it should have gone down. Mr. Burrowes says "the causes of the failure of the truss can be accounted for in various ways." I propose to account for the failure, and not for the causes, and one way is enough. The truss had not strength to stand alone, much less sustain the weight of the chains.

It is a most important enquiry in these days when such a disposition exists for iron bridges of all conceivable shapes, why a structure, which, according to all calculations, was supposed to have a maximum capacity to sustain 124 tons at the center; or 228 tons distributed over its entire length, in addition to its own weight, should have broken down with a load of not exceeding 21 tons, distributed, and most probably not exceeding 10 tons. There must be some unknown element not taken into account in designing structures depending upon the tensile strength of iron. Such terrible errors are not made in wooden structures, and it behooves the Engineers of the country to look to this question before it is too late; for not a day passes but thousands of unconscious travelers are subject to the treachery of such designs as these.

All accounts concur in stating that there was no evidence of flaw in the fracture of the chains—that the bars that broke showed no appearance of fibre, but looked cold short and brittle. Short pieces of the bars were found lying upon the rocks, as if each chain had given way in different places at the same moment, or had broken like cast iron, by falling upon the rocks beneath. But one inference can be drawn from the case before us. It is unavoidable—and that is, that extreme cold changes the structure of the material and destroys the fibre. At a temperature of zero, the bridge, according to Mr. Burrowes, had upon it $13\frac{1}{2}$ times the load that it had when it broke, at a temperature of -30° . According to Mr. Fairbairn's experiments, which Mr. Burrowes refers to, the deterioration of cast iron between $+32^\circ$ and $+16^\circ$ was about 13 per cent. If this ratio continues, the strength at -32° could be but about $\frac{1}{2}$ the strength at $+32^\circ$. If this be the case with cast iron, it is fair to infer that the per centage of deterioration would be greater in wrought. The doubts that this and other similar failures, cast upon the reliability of wrought iron for such purposes, and under such circumstances, calls for extreme care and moderation in its use, until at least some well conducted experiments shall fix upon more reliable formula for ascertaining its value under all temperatures.

Notwithstanding the failure of one suspension bridge at this place, (for this was nothing but a suspension bridge,) it is surprising that Mr. Burrowes should have written the following closing paragraph to his report: "Taking into consideration the amount of work done towards the erection of a wire suspension bridge, I should consider it the most economical; and viewing it in this light, should, under the circumstances, consider it

the most feasible, at the same time recommending as much elasticity to tension as is consistent with the distribution of weight, and counteraction to wave; a principle which I think can be adopted." Beyond the inference that by this, he means to recommend to the government the erection of another structure, subject to the same risks and objections as the last, merely substituting wire cables for wrought iron bars, the paragraph is all Greek to me. I confess not to understand the "principle" which he thinks can be adopted, but if there is any probability that its adoption will prevent the mercury from going down to -30° , then I think it would be well to try another experiment. If it will not have this effect, then the government had better adhere to well tried and well known plans, and venture upon no more doubtful expedients, designed to avoid difficulties which have no existence except in the minds of those who wish their experiments tried. I will venture to find a dozen bridge builders in 24 hours who will erect a wooden truss across the Grand Falls which will sustain a ton to the foot, in length, the whole structure not to cost materially more than the one which broke down under a load of less than 200 pounds to the foot.

In the foregoing remarks I do not intend to reflect upon the general plan of the bridge, except to the use of iron under the conditions recited. Assuming iron to be a proper material in such low temperatures, then I believe the plan adopted to be well conceived, as it is tasteful in appearance, and economical in execution.

A. P. R.

TREATISE ON THE PRINCIPLES OF CIVIL ENGINEERING AS APPLIED TO THE CONSTRUCTION OF WOODEN BRIDGES.

By S. S. Post, Civil Engineer,
And late Chief Engineer of the N. Y. & Erie R. R.

(Continued from p. 310.)

§ 94. For the purpose of reviewing some of the most important of the principles herein before advanced—of illustrating their application in determining the size and strength requisite for the several parts of a structure—and of rendering the subject more familiar to the student, the following examples are introduced.

EXAMPLE A.

Required a railroad bridge of 15 feet clear span, and 15 feet clear width between the trusses, which are to be of the form represented by Fig. 29.

The greatest weight to be sustained at one time is that of a locomotive weighing 60,000 lbs., 40,000 lbs. of which rest at the lowest points of two driving wheels, ten feet from the centre of a four-wheeled truck, the shafts of which are centrally five feet apart.—What will be the least dimensions of the several parts of the bridge, if constructed of White Pine?

The greatest weight that can be brought upon any timber in the structure, at one time, is that of the driving wheels upon the floor beams, or cross-bearers, the ends of which are supported upon the stringers or chords of the trusses on either side of the bridge.

This weight, 40,000 lbs., acts successively upon each of the floor beams in the bridge, and the determination of their size and number, is thus suggested as the first step in the calculation.

The distance between the points of bearing of wheels on opposite rails, varies as the gauges of different roads vary, from $4\frac{1}{2}$ to 6 feet. Suppose it to be 5 feet. Then the weight will be applied $2\frac{1}{2}$ feet from the centre, and may be considered as applied 10 feet from one end of the beam and 5 feet from the other.

Then $(\S 27) 7.5 \times 7.5 : 5 \times 10 :: 40,000 : 35,555 =$ the weight which, if laid upon the middle of the beam, will produce the same effect as 40,000 lbs. applied $2\frac{1}{2}$ feet from the middle.

Here we have the length of the beam (15 feet), the weight to be supported in the middle of the beam (35,555 lbs.) and the kind of timber to support this weight without having its elasticity injured thereby, (represented by $c=0.01168$, table IV.) given to find the breadth and depth of the beam.

Now the depth of the beam is expressed thus:

$$\frac{L^2 \times W \times c}{B} = D^3, (\S 44), \text{ and the breadth thus:}$$

$$\frac{L^2 \times W \times c}{D^3} = B (\S 45).$$

Either of these expressions is equivalent to $L^2 \times W \times c = BD^3$, or, $15 \times 15 \times 35,555 \times 0.01168 = BD^3$, or, 93,438 = the breadth multiplied into the cube of the depth of the beam.

If it be desirable to have the section a square, that is the breadth and depth of the same dimensions, the fourth root or square root of the square root, of 93,438, equal to $17\frac{1}{2}$ inches, will be the breadth and depth, very nearly; for 17.5×17.5^3 , or, $17.5 \times 17.5 \times 17.5 \times 17.5 = 93,789$ which is a little in excess.

If the breadth be fixed at 12 inches, then the depth will be $\left(\frac{93,438}{12}\right)^{\frac{1}{3}} = \sqrt[3]{7,786.5} = 19.82$

inches; or, if the depth be fixed at 16 inches the breadth will be $\frac{93,438}{16^3} = \frac{93,438}{4,096} = 22.81$ inches.

The strength of two beams of half the breadth—of three beams of one-third the breadth—or of four beams of one-fourth the breadth, etc., if the weight be uniformly distributed across them, will be equal to the single beam. In practice such a division is made and uniformity in the distribution of the weight is obtained through the intervention of the track stringers.

Suppose, that, instead of the single beam 16×22.8 inches, three beams $16 \times 7\frac{1}{2}$ inches are substituted for the support of the 40,000 lbs. Suppose, also, that these beams are placed at a distance apart and a track stringer 8 inches in depth and 6 inches in breadth is placed at right angles across their top surfaces, under each driving wheel; the driving wheels resting directly over the middle beam.

What must be the greatest distance between the beams?

The weight upon the centre of each track stringer is 20,000 lbs., of which, one-third part, or 6,667 lbs., is sustained by the middle beam, and the remainder, or 13,333 lbs. must be supported by the strength of the track stringer with its ends resting upon the two outward beams. To find the length of the track stringer, or the distance apart of the outside beams in this case, the expression

$$(\S 46) \text{ is } \frac{D^3 \times B}{W \times c} = L^2; \text{ that is } \frac{8^3 \times 6}{13,333 \times 0.01168} = \frac{3,072}{155.73} = 19.72 = L^2; \text{ and } L =$$

$\sqrt{19.72}=4.44$ ft. = the distance between the two outside beams. Add to this the thickness of one of the beams 0.63 of a foot, and their distance centrally will be 5.07 feet, or from centre to centre of each beam, say 2½ feet. This gives six spaces—and 7 beams for the span of 15 feet.

When a joint occurs in the track stringers, another stringer of equal size must be laid alongside of it, to break that joint and preserve a continuity of the necessary strength.

In bridges of considerable length the track stringers should be composed of two thicknesses of timber, side by side, bolted together with their butt joints alternating each other for a distance of half the length of the pieces employed.

The floor beams at the extreme ends of a bridge may be supported upon the abutments, beneath the rails, otherwise they should be of the full dimensions to support the greatest weight.

The next step will be to ascertain the weight of the materials in the floor beams and track stringers, etc., etc., which the trusses must carry in addition to the weight of the locomotive. Only so much of the material as is found between the abutments need be taken into the account.

5 beams, 17 ft. long, 16 by 7½ inches = 72 cub. ft.
4 stringers, 15 " " 8 " 6 " = 20 " "

Total.....92 " "

The specific gravity of White Pine is 0.455, or 28.43 lbs. per cubic foot (table IV.).

The weight of the beams and stringers is, therefore, when perfectly dry, 2,615 lbs.

To this add the weight of iron rails, say 600 lbs., and for bolts, spikes, ties, the effect of rain or snow, etc., etc., 785 lbs. more, making in all, 4,000 lbs. in addition to the weight of the drivers.

These 4,000 lbs. being distributed uniformly, produce the same effect upon the trusses as would 2,000 lbs. at the centre of the bridge. The greatest load at the middle of the bridge will then be 42,000 lbs., half of which must be supported by either truss, acting (at *c*, Fig. 29) by thrust upon braces (*ac* and *bc*); by tension on the vertical tie (*cd*) and upon the chord (*ab*).

The direct cohesion of bar iron, at a mean temperature, is about 60,000 lbs. per square inch of section (table I.) At a temperature of 40° below zero it does not, probably, exceed 15,000 to 20,000 lbs. At ordinary temperature, wrought iron may be subjected to occasional strains of 15,000 lbs. per square inch, which will produce an extension of about .0006 of its length, but will not, materially, injure its elasticity. Except in climates where excessive degrees of cold are sometimes experienced, it will be safe to rely upon it for a permanent strain of 10,000 lbs. per square inch. The vertical tie (*ad*), if of wrought iron, of best quality, well annealed, will be of sufficient strength with a section of 2.1 inches, which is very nearly equal to that of a round rod 1½ inches in diameter.

Suppose the height of the truss to be one-sixth of the span, (as in Fig. 37 and 43). Then the length of each brace (*ac* and *bc*) is 3.16 times the height—and as each brace supports, vertically, 10,500 lbs., the force acting in the direction of each brace with a tendency to compression is 33,180 lbs.; for, 1 : 3.16 :: 10,500 : 33,180.

To resist this thrust we have braces 7.9 feet long. If we assume 6 inches as the least thickness of the braces, they will be 15½ diameters in length

and will sustain a compression of 738 lbs. per square inch, (as per table VI. § 91.) The area of the section will then be $\frac{33,180}{738} = 45$ inches = $6 \times 7\frac{1}{2}$ inches.

Or, assuming 6½ inches as the least thickness of the braces, they will be about 14½ diameters in length and may resist a compression of 790 lbs. per square inch, without bending. In such case the area will be $\frac{33,180}{790} = 42$ inches = $6\frac{1}{2} \times 6\frac{1}{2}$ inches nearly.

The tension on each chord (*ab*) will be 31,500 lbs.; for the height is to the half span, as half the weight is to the horizontal strain, as has been demonstrated, (§§ 78 and 79), that is 1 : 3 :: 10,500 : 31,500.

This requires a sectional area of 31.5 inches, at 1,000 lbs. per square inch. If we suppose that the chord must be reduced one-half its size, in forming a shoulder or abutment against which a brace is to act, to produce the tension, then the section should be double that just given or 63 square inches. Assuming its thickness to be 7 inches, its depth will be 9 inches.

Finally, it is necessary to ascertain if these dimensions of the chord are sufficient to support the weight to which it will be subjected at the middle points, between *a* and *d* and between *b* and *d*, Fig. 29. This weight upon each chord will be equal to 20,500 lbs. acting at the middle of a beam 7.5 feet long. Then $\frac{7.5 \times 7.5 \times 20,500 \times 0.01168}{7} = 1,924$, the cube of the depth (§ 44) and $\sqrt[3]{1,924} = 12.44$, or say 12.5 inches the depth of the chord required in case the thickness is 7 inches.

The greatest vertical pressure of the braces upon the chords, is 10,500 lbs. each, and their bearings should not be upon a surface less than 7.5 by 7 inches to prevent crushing; for $7.5 \times 7 \times 200 = 10,500$ (§ 92). The greatest load upon the ends of the chords will be 21,000 lbs. each, requiring a fair bearing upon the abutments of 15 inches by 7 inches.

EXAMPLE B.

A railroad bridge 22.5 feet clear span is required of the form of truss represented by Fig. 39. The height being one-sixth of the span, and the weight of the locomotive the same as in example A.

It is evident that the dimensions of the floor beams and track stringers in this case, and indeed in most cases, will be the same as required in example A, the sectional area of these timbers not being materially affected by the length or kind of truss.

In this case there will be between the abutments, 8 beams, 17 ft. long, 16 by 7½ inches = 115.5 cub. ft.
4 stringers, 22.5 " 8 " 6 " = 30 " "
to the weight of which in wet weather, add that of the iron rails, chairs, spikes, ties, etc. The whole may be estimated at 6,000 lbs., or 3,000 lbs. upon each truss.

The chord (*ab*) may be considered as divided into three portions of equal length (*af*, *fg* and *gb*) supported by the abutments (*a* and *b*) and the vertical ties, (*df* and *eg*). Each portion of the chord is, therefore, 7.5 feet in length, between its points of support, and sustains one-sixth part of the flooring, track, etc., or 1,000 lbs. uniformly distributed—equal to 500 lbs. at the middle.

The greatest lateral strain, then, to which the chord can be subjected, will be the weight of locomotive (20,000 lbs.) and of flooring, etc. (500 lbs.), in this case 20,500 lbs.

A White Pine beam 7.5 feet long to sustain a weight of 20,500 lbs. at the middle, without injury to the elasticity of the fibre, if 8 inches in breadth, will require a depth of 11.9 inches; for, $\frac{7.5 \times 7.5 \times 20,500 \times 0.01168}{8} = 1,683.56$ and $\sqrt[3]{1,683.56} = 11.9$.

If the track stringers be made so perfectly inflexible as to effect a completely uniform distribution of the weight of the driving wheels of the locomotive over each 7.5 feet of the bridge, the lateral strength of the chord may be reduced one-half, or say to $8 \times 9.5 = 76$ square inches.

Taking the greater depth as more safe, the chord will contain about 15 cubic feet of timber, and, at 30 lbs. per cubic foot, will weigh 450 lbs.

The greatest load that can be brought to act upon any one of the vertical ties will be,
One-half weight of drivers.....20,000 lbs.
One-sixth of floors, tracks, etc.....1,000 "
One-third of chord.....150 "

Total.....21,150 lbs.

If round bar iron be employed for these ties, it should be very nearly 1½ inches in diameter in its least section,—or say a sectional area of 2½ inches, which, at 10,000 lbs. per square inch, will carry 22,500 lbs.

Wrought iron, 1½ inches diameter weighs 8 lbs. per lineal foot. In this case the bolts with suitable head, nut, collar, etc., will weigh about 56 lbs. each.

The greatest vertical strain at the head of either brace will be $21,150 + 56$ —half the weight of the straining beam, say 30 lbs. or in all 21,236 lbs. But (§ 75) two-thirds only of this weight, or 14,157 lbs. act vertically upon any one brace at one time. This being resolved into its horizontal and oblique forces (§ 6, *c*.) will give 28,314 lbs. as the tensile strain on the chord, and, consequently, an equal tendency to compression on the straining beam.

The straining beam is 7.5 feet long. Assuming it to be 6 inches square, it would be 15 diameters in length, and (table VI.) would withstand a thrust of 775 lbs. per square inch of section. Then $775 \times 36 = 27,900$ lbs., which is somewhat too little.

But $\frac{28,314}{775 \times 6} = 6.1$ very nearly, and 6×6.1 will give a sufficient cross section. It contains, therefore, nearly two cubic feet and will weigh about 60 lbs.

The inclination of the braces, in this case, being as 2 horizontal to 1 vertical, their length will be equal to 2.236 times the height of the truss; for $\sqrt{1^2 + 2^2} = \sqrt{5} = 2.236$.

The thrust in the direction of the brace will be $14,157 \times 2.236 = 31,655$ lbs.

The distance between the chord and straining beam is 3.75 feet; the length of the shortest or under side of the brace is $2.236 \times 3.75 = 8.385$ feet or 100½ inches. The top length of the brace will be nearly a foot and a half greater than the under side, so that the average length may be assumed at 9 feet or 108 inches. Taking the brace at 6.5 inches square, it will be 16½ diameters in length and should resist a thrust of 733 lbs. per square inch of section. Then $6.5 \times 6.5 \times 733 = 30,969$ lbs.,

a result 686 lbs. too small. Increasing one side an eighth of an inch, the result will be $6\frac{1}{8} \times 6\frac{1}{8} \times 733 = 31,565$ lbs., only 90 lbs. too small.

A brace of these dimensions will contain 2.7 cubic feet and weigh about 80 lbs.

To be more precise as to the tensile strain upon the chord, when the load is sustained at the points d or e , Fig. 38, we have,

One-half weight of drivers.....	20,000 lbs.
One-sixth of floor-beams, rails, etc....	1,000 "
One-third of chord	150 "
One iron tie-rod	56 "
One-half straining beam	30 "
One brace	80 "

Total..... 21,316 lbs.
two-thirds of which, or 14,210½ lbs. act, vertically, at the foot of one brace, and 7,105½ at the foot of the opposite brace in the same truss. Then

1 : 2 :: 14,210½ : 28,421½,
1 : 4 :: 7,105½ : 28,421½, gives the horizontal strains in either direction.

To resist the tensile strain upon the chord at 1,000 lbs. per square inch, requires a cross section of 28.4 inches; while, to resist the lateral strains, a section, at least two or three times as great, is necessary.

If the two braces were to meet at the top without the intervention of a straining beam, as represented by Fig. 37, and the weight ($W=21,316$ lbs.) applied at the centre, it is clear that the horizontal strain would be $1 : 3 :: \frac{21,316}{2} : 31,974$.
Now $3 \times 3 : 31,974 :: 4 \times 2 : 28,421\frac{1}{2}$ which verifies the other calculation.

EXAMPLE C.

Suppose the truss to be of the general form represented by Fig. 43.

Span 30 feet—height 5 feet—weight of floor beams, track, etc., per lineal foot of bridge, and locomotive, the same as in examples A and B. The truss being divided into four panels, 7.5 feet long, the lateral dimensions of the chord may be taken the same as in the last example to wit: 8 by 11.9 inches.

Of the weight of the floor beams, track, etc., estimated at 8,000 lbs.—1,000 lbs. will be supported by each of the vertical ties (ef , dh and eg).

When the driving wheels of the locomotive bear at the middle of the bridge, the middle tie (dh) must sustain 21,150 lbs. This tie, if of bar iron, should have a section of 2½ inches, and will weigh about 50 lbs.

The upper chord or straining beam may be estimated, for the present, to weigh 200 lbs. Then the weight (W) acting upon the top of the central braces at d will be—

One-half weight of drivers.....	20,000 lbs.
One-eighth of floor beams, track, etc....	1,000 "
One-fourth of chord	150 "
One vertical iron tie	50 "
One-half of upper chord	100 "

Total at centre..... 21,300 lbs.
one-half of which (10,650 lbs.), is supported vertically, by each of the central braces, giving rise to a horizontal strain at their junction (d) and upon the lower chord between the points f and g , equal to a force of 15,975 lbs. It also gives rise to an oblique force, in the direction of those braces, of 19,170 lbs.

These braces are 9 feet, or 108 inches long, and, assuming them to be 4½ by 8 inches, are 22.75

diameters. Each will be capable of withstanding a thrust of 500 lbs. per square inch, or, $4\frac{1}{2} \times 8 \times 500 = 19,000$ lbs. It will contain 2½ cubic feet and weigh 75 lbs.

The vertical force acting at d upon the brace df is transferred to f and, again, to e , by means of the vertical tie (ef) when the weight at e is augmented as follows:—

Weight at d transferred to f	10,650 lbs.
Do. of brace df	75 "
Do. ½ of floor beams, track, etc....	1,000 "
Do. ¼ of chord	150 "
Do. iron tie rods, etc., dh	50 "
Do. ¼ of top chord	50 "
Do. locomotive truck	6,666½ "

Total vertical force at e 18,641½ "

The last item (6,666½ lbs.) is the effect at f of the weight of the truck, and is obtained in the following manner. The drivers being at the middle of the bridge; the centre of the truck is 5 feet from the abutment and 2.5 feet from the point f . These distances being as 2 to 1, it is evident that ½ of the weight will be supported at f and ¼ at A . The weight of the tender, on the opposite end of the bridge, acting at g will nearly counterbalance that of the locomotive truck, so that the whole of the 18,641½ lbs. may be assumed to act vertically, on each end brace.

The oblique force in the direction of the end brace will then be 33,555 lbs. Assuming the brace to be 6 by 8 inches, it will be 18 diameters long, and (table VI.) will bear a thrust of 700 lbs. per square inch. Then $6 \times 8 \times 700 = 33,600$ lbs.

The horizontal force resulting from the 18,641½ lbs. is 27,962.5 lbs., and acts upon the top chord (ce) with a tendency to compression, as well as upon the bottom chord (AB) with a tendency to extension.

The whole length of the top chord is 15 feet. At the middle it is secured from vertical, but not from horizontal deflection. Taking the horizontal breadth at 8 inches, it will be 22.5 diameters long, and will resist 505 lbs. compression per square inch. Then $8 \times 7 \times 505 = 28,280$ lbs., a slight excess.

The top chord will, therefore, be 15 feet long, with a section 7 by 8 inches. It will contain 6 cubic feet and weigh 180 lbs. instead of 200 lbs., as assumed before determining its necessary dimensions.

The horizontal strain of 27,962.5 lbs. acts upon the whole length of the lower chord, and that of the 15,975 lbs. acts in addition thereto between the points f and g , consequently the whole tensile strain between f and g is 43,937.5 lbs.

To verify this result by another calculation, on the supposition that the whole weight (W) is applied at d .

Weight at d transferred to f	10,650 lbs.
Additional weight at e	7,991½ "

Total weight at e 18,641½ lbs.

Now suppose the weight, or its equivalent, to be transferred from e to d . Of this 10,650 lbs. is actually applied at that point. The 7,991½ lbs. at e produce the same effect as one-half that weight (3,995½ lbs.) at twice the distance from A , that is at d .

Therefore, the equivalent weight at d is—

$$10,650 + 3,995\frac{1}{2} = 14,645\frac{1}{2} \text{ lbs., and}$$

$$dh : ah :: W : \text{horizontal strain; or,}$$

$$1 : 3 :: 14,645\frac{1}{2} : 43,937\frac{1}{2} \text{ lbs.}$$

Having determined the strains resulting from an application of the maximum load to the middle point of the truss, it is proper to ascertain the effect of a change of position of the load. Suppose the driving wheels bear at g , and the truck 2.5 feet from h towards f . Then ¾ of the weight of the truck may be considered as supported at f , and ¼ of its weight at g .

The whole weight of the truck (20,000 lbs.) is supported one-half by each truss, and in this case, the stress at g is 3,333½ lbs.

The weight at e may be summed up as follows:

Weight of drivers.....	20,000 lbs.
Do. of truck	3,333½ "
Do. ⅙ of floor beams, track, etc....	1,500 "
Do. ¼ of chord	225 "
Do. one and a-half ties	75 "
Do. ¼ top chord	90 "

Total vertical pressure at e 25,223½ lbs.

The weight at e will be:—

Weight of truck	6,666½ lbs.
Do. ⅙ of floor beams, track, etc.	1,500 "
Do. ¼ of chord	225 "
Do. one and a-half vertical ties	75 "
Do. ¼ top chord	90 "
	8,556½ "

Difference..... 16,666½ lbs.

Of this difference three-fourths, or 12,500 lbs. are supported vertically at B and one-fourth at A . Then $12,500 + 8,556\frac{1}{2} = 21,056\frac{1}{2}$ lbs. will be the greatest vertical strain upon the top of the brace eB . The greatest horizontal strain 31,585 lbs., and the greatest oblique strain 37,902 lbs.

It will now be seen that the upper chord and the end braces, as at first calculated, are too small and must be increased something as follows:—

Top chord, $8 \times 8 \times 500 = 32,000$ lbs.

End brace, $6\frac{1}{2} \times 8 \times 700 = 37,800$ "

The greatest weight upon the end of the bottom chord at any time, will be about 24,000 lbs. Allowing 200 lbs. per square inch (§ 93) as the limit of safety against a crushing tendency, the chord should have a bearing upon the abutment of 8 by 15 inches at least. To distribute the weight fairly upon the masonry, the chord should, perhaps, have a bearing of 30 inches on each abutment. This will give a length of 35 feet for the whole structure.

A schedule may now be prepared of the materials requisite to answer with precision the conditions of the case proposed.

BILL OF MATERIALS

For a railroad bridge, 30 feet clear span—15 feet in clear between trusses—of White Pine timber.

	Feet long.	Inches.	Cub. ft.
2 chords	35	$8 \times 12 = 46\frac{1}{2}$	
2 "	15½	$8 \times 8 = 13\frac{1}{2}$	
4 braces	10½	$8 \times 7 = 16\frac{1}{2}$	
4 "	10½	$8 \times 5 = 11\frac{1}{2}$	
14 beams	16½	$7\frac{1}{2} \times 16 = 199$	
2 "	16½	$12 \times 20 = 55$	
2 track stringers	35	$8 \times 12 = 46\frac{1}{2}$	
2 wall plates	18	$6 \times 15 = 22\frac{1}{2}$	
2 "	3	$6 \times 15 = 3\frac{1}{2}$	
6 iron bolts, 6 ft. 8 in. head to collar, 1½ in diameter			300 lbs.
Iron stirrups for braces, etc.			120 "
Do. bolts for floor beams, stringers, etc.			240 "

Total weight..... 660 lbs.
(To be continued.)

Journal of Insurance Law.

A remarkable case has recently been determined in the New York Court of Common Pleas, which will be of interest to our readers. The case was not indeed a suit by or against a railroad company. But the principles decided are directly applicable in any action which may be brought under the recent statutes of many of our States, to recover damages for death caused by a negligent or wrongful act. These actions are often brought against railroad companies.

The facts in the case of which we speak were as follows:

Action was brought by the representatives of one Warner, to recover damages under the statute of New York, for his death, as caused by the unlawful act or neglect of defendant. It appeared that on the day of Mr. Warner's death, the defendant, who was a householder in the city of New York, directed his servant, Michael Fagan, to clear the snow off of his (defendant's) house. Fagan procured another man named Cashan to help him, and the two commenced shoveling the snow from the roof, throwing it into the street. Some of the snow, or snow and ice, thus thrown, fell upon the head of Mr. Warner, as he was passing along on the sidewalk below, and killed him. It appeared that Cashan went about the work merely to oblige his friend Fagan; but it could not be ascertained which of the two men threw the identical shovel which caused the death.

At the time of the accident, Mr. Warner's life was insured for the benefit of his wife, and she has since been paid the proceeds of the policy, \$2,400.

The defence made chiefly two points:—

1. That, if the jury should find for the plaintiff, they should take into consideration, in assessing damages, the money received from the Insurance Company.

2. That, as the defendant did not authorize Fagan to employ Cashan, he was not liable for the act or negligence of Cashan. The burden of proof was on plaintiffs to show that the death was caused by Fagan and not by Cashan, and if they were in doubt as to this, they must give the defendant the benefit of the doubt. And that the defendant could not be held liable even for the act or neglect of Fagan, his servant, unless he himself was privy to it, and directed, or knowingly assented to the particular mode adopted by his servant of removing the snow from the roof.

The court however held, BRADY J., delivering the opinion.

1. That the jury ought not, in assessing damages, to take into consideration the insurance money received by plaintiffs. *Maisen vs. Sims-bury* 3; *Dougl.* 61; *Clarke vs. Inhabitants of Blything* 2; *Bam & Co.* 254; *Yates vs. Blythe*, 4 Bing., N. C., 272. Without reference to these adjudications, there were principles from the relations of the parties, and the statute creating the right of action, in favor of the plaintiffs, which forbade the consideration of any benefit elsewhere received. Jane C. Warner was entitled to the whole benefit of the policy of insurance. It was for her benefit alone, and it was secured by the payment of a premium to which the defendant did not contribute. But the benefit growing out of the right of action, now sought to be enforced, were not given to her by the statute, but were given to the

widow and next of kin, and did not arise on any common law liability. They were therefore *res inter alios acta*. The case was very different from that which would be presented from injury to a chattel, and it rested upon a statute, the object of which was to punish the wrong doer, who, by his carelessness, destroyed life. There was no privity between him and the insurance company, and they could not repair the injuries caused by the defendant. They could not restore to the widow and next of kin to the deceased the society, advice, and protection which he could have afforded them, aside from the pecuniary losses incident to the deprivation which his death occasioned.

2. That the defendant was liable in damages whether the death of Warner was caused by the act of Fagan in throwing snow, or that of Cashan. Fagan was engaged in removing the snow from the defendant's house, and by his express direction, when Warner was killed. It was true that Fagan had asked Cashan to help him, but this did not change defendant's responsibility. (1 Blackstone's Com. 431.) The following cases illustrate the doctrine that, where the master has entrusted the servant with the performance of a service, it is no answer in an action brought to recover damages resulting from the manner in which the service is performed, that the servant acted improperly in the performance of it; the master must respond because he has put it in the power of the servant to do the injury. (*Bush vs. Steinman*, 1 Bvs. & P., 404; *Randleson vs. Murray*, 8 Nd. & E., 109; *Stone vs. Cartwright*, 6 T. R., 411; *Sloath vs. Wilson*, 9 Carr. & P., 607; *Borth vs. Mista*, 7 Carrs. & P., 66.) The defendant here did not part with the control of the work. Fagan was his coachman, and was directed to remove the snow. He was entrusted with the duty and the manner of doing it, no specific directions having been given. He sought the aid of another with whom he acted in concert, both being engaged at the same time and acting in the same manner in removing the snow. It was wholly immaterial whether the death of Mr. Warner was occasioned by either Fagan or Cashan. The employment and direction was general, and it was not necessary to show that the master was privy to the negligence of his servant, nor need the manner in which a service is performed, under a general direction, be assented to by the master, in order to charge him for injuries resulting from the manner adopted.

The court therefore affirmed the judgment in favor of plaintiff, appealed from.

Savannah, Albany and Gulf Railroad.

The City of Savannah has agreed to endorse the bonds of the Savannah, Albany and Gulf railroad to the amount of \$300,000 to enable that company to meet all its engagements promptly, and particularly to pay their subscription to the Main Trunk, of \$200,000; the bonds to run twenty years, and the interest to be paid by the road.

Farm Mortgage Bonds of the Wisconsin Railroads.

The Chicago Press learns from a source entitled to credence, that the Supreme Court of Wisconsin has agreed upon a decision declaring the Farm Mortgages and City and County Bonds issued to railroads in that State, to be unconstitutional and void. The non-resident bondholders, it is said, will immediately institute proceedings in the Circuit or Supreme Court of the United States to

test the validity of their securities; but as the U. S. Supreme Court has always been guided, in its construction of local laws, by that put on them by the State Courts, it is not probable that anything will be gained by carrying the suits to that tribunal.

Heavy Forgings.

During the past week the heavy double crank shaft, weighing 8,358 lbs., intended for the engines of the new sloop of war, Iriquois, now building at the Navy Yard, was delivered to the contractors, Messrs. James Murphy & Co. It was manufactured at the works of Lazell, Perkins & Co., Bridgewater, Mass.,—one of the largest and oldest establishments of the kind in the country. The shaft is composed of Swedish scrap iron, worked in open charcoal fires, and the grain of the iron is made to continue the whole length of the shaft, and over or around the throws, thus making it stronger and firmer than the usual scrap iron forgings. Messrs. Lazell, Perkins & Co., are constantly turning out heavy forgings for steamers and machinery; also cranks for locomotives, axles for cars, &c., which are pronounced by those who have used them, of the very best quality. Samples of their car axles, &c., may be seen at the Supply Establishment of Messrs. Low & Burgess, No. 55 Liberty st., who are their agents.

Forged Stamp of Lowmoor.

Last week, in the United States Court at Pittsburgh, Pa., the case of Hird, Dawson and Hardy, vs. Graff, Bennett & Co., was tried. Stanton and Shaler for plaintiffs, Loomis and Shinn for defendants.

The plaintiffs are manufacturers of iron in England; the defendants are also manufacturers of iron, in Pittsburgh. The suit was based on the use of a trade mark, or stamp, "Lowmoor," claimed and used by the plaintiffs. The genuine "Lowmoor" iron is of very superior quality, and is chiefly used in this country by railroad companies. It was alleged by the plaintiffs that an inferior iron was made and disposed of by the defendants, bearing the "Lowmoor" stamp, to the great injury of the plaintiffs.

The papers offered in evidence by the plaintiffs were read by Mr. Stanton; they contained the affidavits and depositions of different members of the firm of Lake, Brown & Co., in Chicago—the correspondence relative to the iron branded "Lowmoor," and various bills of sale. The affidavits set forth that the iron had been made by order of Lake, Brown & Co., by Graff, Bennett & Co. It was different in appearance to the genuine "Lowmoor." It had been sold by Lake, Brown & Co. Several highly respectable witnesses testified to the superior merits of genuine "Lowmoor" iron.

The jury retired, and in half an hour returned with a verdict for plaintiffs in the sum of \$146 46.

Operations of the United States Mint.

The gold coinage of the United States Mint, in Philadelphia, for the month of April, was \$42,520, mostly in gold dollars. The silver coinage was \$12,500, being in dollar, half dollar and dime pieces. Of cents, \$29,000 were coined. The whole number of pieces coined were 3,808,539, of the aggregate value of \$200,020. The total gold deposits of the month were \$74,000, of which \$51,105 were from California, and \$23,095 from other sources. The silver deposited was \$190,015. Old cents deposited \$3,800.

Cincinnati Stock Sales.

By KIRK & CHEEVER.

For the week ending May 19, 1859.

BONDS.	Per cent.	
Little Miami, 1st Mort.	6s.....83	and int.
Covington and Lexington, 1st Mortgage ..	6s.....	
Do. do. 2d do.	7s.....60	
Do. do. Income	10s.....	
Ohio & Miss., E. D., Construction ..	7s.....	
Cinc., Ham. and Dayton, 1st Mortgage ..	7s.....	
Do. do. 2d do.	7s.....85	
Indianap. & Cincinnati, do. do.	7s.....83	
STOCKS.		
Cincinnati, Hamilton & Dayton	80	
Columbus and Xenia	85	
Indianapolis & Cincinnati	85	
Little Miami	90	
Ohio and Mississippi (E. D.)	90	

Railroad Earnings.

The earnings of the North Pennsylvania Railroad Co. in April were\$28,762 51
 April, 1859 25,243 35

Increase\$3,519 16
 In five months ending April 30.....\$127,727 60
 Same time last year..... 110,846 88

Increase\$16,880 72

The earnings of the Chicago, Burlington and Quincy Railroad in April, 1859, were:

Freight\$47,667 65
 Passengers 30,701 18
 Mails and miscellaneous 1,618 33

Earnings per mile, \$499 92. Total....\$79,987 16
 Operating expenses estimated at..... 45,000 00

Net earnings.....\$34,987 16

BETWEEN CHICAGO AND BURLINGTON—210 MILES.

Freight\$54,252 38
 Passengers 36,544 70
 Mails and miscellaneous . 1,872 33—\$92,669 41

BETWEEN GALESBURG AND QUINCY—100 MILES.

Freight\$17,763 86
 Passengers 13,061 95
 Mails and miscellaneous.. 833 33—\$31,709 16

Being \$401 22 per mile, Total for
 310 miles\$124,378 57
 Earnings in April, 1858 181,348 97

Decrease in 1859.....\$6,970 40

The earnings of the Norwich and Worcester road in April were:

	1858.	1859.
Passengers	\$9,461 86	\$10,078 25
Freight, &c	15,365 27	17,160 63

Total\$24,827 13 \$27,238 88
 Increase 2,411 75

The earnings of the Michigan Southern and Northern Indiana Railroad for April 1858 and 1859 (partly estimated,) were:

	1859.	1858.
Passengers	\$67,902 29	\$96,849 71
Freight.....	68,032 96	79,686 40
Mails.....	4,435 56	4,485 62
Express and miscella's.	4,141 65	25,483 77

Total\$144,512 46 \$206,505 60
 Decrease 61,993 14

The receipts of the Michigan Central road for April were:

	1858.	1859.
Passengers	\$114,773 79	\$73,885 13
Freight.....	102,236 81	63,791 31
Miscellaneous	5,999 77	5,496 86

Total\$223,010 37 \$143,143 30
 Decrease..... 79,867 07

The receipts of the Cleveland, Columbus and Cincinnati Railroad were—

April, 1859\$81,425 00
 April, 1858 93,872 31

Decrease.....\$12,447 31

The revenue of the Baltimore and Ohio Railroad for April was as follows:

	MAIN STEM.
Passengers	\$56,097 24
Express	3,770 00
Mails.....	8,085 33
Tonnage	241,419 24—\$310,371 81

	WASHINGTON BRANCH.
Passengers	\$25,449 07
Express	1,300 00
Mails.....	1,000 00
Tonnage	6,361 74— 34,110 81

	SOUTH-WESTERN VIRGINIA.
Passengers	\$4,116 23
Express	
Mails.....	866 67
Tonnage.....	19,601 81— 24,584 71

Total\$369,067 33

Compared with the same month last year, the following result is shown:

	1858.	1859.	Decrease.
Main Stem..	\$411,546.56	\$310,371.81	\$101,174.78
N.W. Virginia	3,352.57	24,584.71	8,767.86
Wash. Br. . .	38,659.29	34,110.84	4,548.48

Total...\$483,558.45 \$369,067.33 \$114,491.12

It will be seen that the revenue of the road has fallen off, as compared with April, 1858, in all its departments, the aggregate decrease being \$114,491 12. The heaviest decrease is in the tonnage on the Main Stem, which, in April, 1858, amounted to \$348,063 45, against \$254,274.47 for April, 1859. This has been caused partly by the small amount of freight now coming from the West, but mainly by the suicidal competition between the four great Atlantic lines, which has so greatly reduced the rates of transportation. Compared with the previous month of March, the revenue of the road shows a decrease of \$40,993 69.

The financial year of the company commenced with October. The receipts of the first seven months of the present year compare with those of the previous year as follows:

	1858-9.	1857-8.
October.....	\$392,503 02	\$396,191 85
November.....	383,159 22	361,443 38
December.....	336,861 01	379,259 02
January	327,176 63	317,513 73
February	321,391 10	277,044 49
March	410,061 21	439,061 02
April	369,067 33	483,558 45
	\$2,540,219 52	\$2,657,071 94

Dec. present year. \$116,852 42

The earnings of the Stonington Railroad Company were in—

April, 1859.....\$19,953 88
 " 1858..... 17,909 93

Increase.....\$2,043 95

The earnings of the Little Miami, Columbus and Xenia Railroad, for April, compare as follows:

April, 1859.....\$84,823 67
 April, 1858..... 91,804 61

Decrease.....\$6,980 94

The earnings of the Galena and Chicago Union Company for the month of April were:

	1858.	1859.	Decrease.
Freights	\$85,675 27	\$51,459 87	\$34,115 40
Passengers .	51,557 41	34,881 56	16,675 85
Mails, etc., .	4,200 87	3,700 00	500 87

Totals..\$141,333 55 \$90,041 43 \$51,292 12

Corrected earnings for the previous month, \$92,920 62.

The comparative earnings of the Pacific Railroad for the three months ending March 31, 1858 and 1859, were:

	Passengers.	Freight.	Mails.	Total.
1859	\$76,427.37	77,486.28	6,112.50	160,026.15
1858	58,860.32	54,122.77	3,906.26	116,889.35

Inc ..\$17,567.05 23,363.51 2,206.24 \$43,136.80

Earnings per mile, 3 months, 1858, (125 miles to Jefferson City).....\$935 11

Earnings per mile, 3 months, 1859, (163 miles to Tipton) 981 75

Earnings South-west Branch Pacific Railroad—

19 miles—for three months ending March 31, 1859:

Passengers\$1,067 90
 Freight 1,606 71

Total\$2,674 61

The receipts of the Cleveland and Toledo road were in—

April, 1858.....\$84,148
 " 1859..... 62,050

Decrease\$22,098

The receipts of the Grand Trunk Railway of Canada for the week ending April 30,

were.....\$46,222 87
 Week ending May 1, 1858 46,424 74

Decrease.....\$201 87

Total traffic from July 1st.\$1,907,162 41
 Same period last year 1,994,397 62

Decrease\$87,235 21

The earnings of the Central Railroad Company of New Jersey for the month of April were—

1859\$81,824 95
 1858 70,907 77

Increase (15 per cent.).....\$10,917 18

The following is a statement of the Ohio and Mississippi railroad earnings for April:

	1859.	1858.
Passengers	\$74,626 72	\$75,615 80
Freights	48,059 86	48,534 24
Express	3,315 00	3,315 00
Mail	6,633 33	5,150 00

Totals.....\$132,634 91 \$132,615 04

Increase.....\$19 87

Boston, Concord and Montreal Railroad.

It will be recollected that this railroad corporation failed to meet its engagements some year and a half ago, and went into the hands of trustees. Arrangements were immediately set on foot to liquidate the floating debt, which amounted to about \$250,000. Under the energetic management of a committee of the stockholders, a considerable sum was raised by the issue of new bonds, which had been authorized by the Legislature, and with the proceeds the creditors of the road were paid, partly in cash and partly in bonds. The floating debt which caused the embarrassment of the road has now been entirely paid or funded, and the whole property of the corporation was on Thursday last re-transferred by the trustees to the Board of Directors, by whom the road will hereafter again be managed in behalf of the stockholders. The whole debt of the road is now funded, with the exception of about \$70,000, (which amount of a recent award for damages) which is to be liquidated in easy annual payments. The whole funded debt is but little over \$1,000,000, and its property is worth \$2,000,000. The net earnings with a continuance of prudent management will exceed \$100,000 per year—an amount amply sufficient to pay the interest on the debt, to meet all other engagements, including the amount annually set aside for a sinking fund, and still leave a surplus for the stockholders. The road has never failed one of the best securities of the kind now in the to pay the interest on its bonds, which are now

market. They are in request at improving prices, and as provision has been made for their ultimate liquidation by a sinking fund, they are actually worth, for investment, their par value. Bondholders and owners of preferred stock will do well to hold on to their investments.—*Boston Journal.*

American Railroad Journal.

Saturday, May 21, 1859.

Railroad Summary for the Week.

Railroad Competition.—Several attempts have been made within a few days past to effect some arrangements whereby to put an end to the present competition between our leading railroads, all of which have fallen through from the fact that they contemplated a restoration of relations similar to those against which the New York Central rebelled. Such arrangements, we presume, the Central Company do not propose to renew.

The greatest sufferer in this unhappy controversy appears to be the *Erie*. In a contest like the present it has less strength than any of its antagonists, and consequently goes first to the wall. If the present competition continues during the season, the Erie will make a poor show at the close of the year. Its net receipts for the past year were a little over \$1,000,000. Its receipts this year will probably be less by more than a million than those of 1858. If so, net receipts will not be much better than *nil*. In the meantime, we see no evidence of any change in the policy or management of the company, which, outside the Board of Directors, has not a sincere defender or apologist, we presume, in the United States. Wisdom in these days is confined within a very small circle.

New York and New Haven.—The annual meeting of this Company was held on the 12th inst. The old Board of officers were elected, viz.:—Justus R. Bulkley, George N. Miller, Abraham R. Van Nest, George B. Carhart, Dennis Kimberly, John Bradley, John W. Leeds, Jonathan Godfrey, and Erastus C. Scranton.

The receipts of the past year were as follows:

From passengers.....	\$624,795 43
From freight.....	157,949 77
From mails, expresses, &c.....	45,946 75
Total	\$828,691 95
Total expenses	512,859 33

Net earnings of the road.....\$315,832 62
Receipts from other sources..... 35,156 62

\$351,832 62

This amount has been applied as follows:

Paid on second track extension, &c., balance	\$5,181 81
Paid loss in operating the canal road.....	32,500 00
" interest coupons on bonds.....	142,600 00
" dividend of 3 per cent.	90,000 00
By reduction of accounts payable on April 1, 1858, viz.: coupons, balances due other roads, &c.....	50,372 13
Cash remaining on hand April 1, 1859	31,435 59

\$351,000 54

There was a warm discussion upon the subject of *dead-heads*—the officers being accused of granting such favors, which was emphatically denied. The general unproductiveness of the road was not alluded to. Gnats were strained at, and camels swallowed. Out of gross earnings at the rate of 18½ per cent., the stock and bondholders have

been able to realize only about 4½ per cent.; 14 of the 18 per cent. going to expenses—a result not equalled by any railroad in the United States having as good a route and traffic. Yet the discontent of the stockholders finds a sufficient vent in a smart discussion upon the subject of *dead-heads*.

N. Y. and Harlem.—The election of Directors of the Harlem Railroad took place Wednesday last, the old Board being elected without opposition, viz.:—Allan Campbell, Wm. C. Wetmore, Cornelius Vanderbilt, Daniel Drew, Francis W. Edmonds, Chas. W. Sanford, Horace F. Clark, John Alstyne, Horace Brooks, Albert Smith, Albert J. Akiro, John Harper, and A. B. Baylis.

This road appears to be doing remarkably well, steadily increasing its receipts, and economizing in its expenditures. What is marvelous in this result is, the fact that the Company have a list of *dead-heads*, on which are some *editors*. The Erie never indulges in such follies. Everybody riding on that road pays.

Pittsburg, Fort Wayne and Chicago Railroad.

—We give in another column the report of this company for the past year. We give it the credit of presenting to the public a model report. Everything in reference to its operations is fully and lucidly stated. Such statements imply a good degree of information upon the subject to which they relate. Many of our leading companies say nothing, because their officers know little or nothing about the roads of which they have charge; or because they do not chose to tell us what they do know.

The War News.—It is certainly an anomaly that the prospect of a general war in Europe should be regarded as favorable to the interests of a great commercial nation like the United States. It proves how separated we are from Continental politics. Already the price of *wheat* is higher by twice the cost of carriage from Chicago to New York. Such an advance is exactly the stimulus wanted to give life to the leading railroads of the country—an active demand for our agricultural products, which seem to be in prospect for a year at least. Our ships will reap their share of the general advantage. Cotton is effected injuriously, but the crop is so far gone forward that little loss will be suffered by our people by the fall.

Morris and Essex Railroad.—At the meeting of the stockholders of the Morris and Essex Railroad, held at Newark on the 17th inst., it was resolved that the Hudson River terminus of the extended road shall be at Hoboken, and that the cost of the extension shall be defrayed by a stock distinct from that of the present issue.

Railroad Earnings continue light. The Erie we understand falls off \$180,000 from April of last year. The earnings of the Galena and Chicago for the week ending May 8th, were \$24,098, against \$41,416 for April 1858; those of the Michigan Southern, for the two weeks in May, were \$60,912, against \$71,252 for a corresponding period the past year. The earnings of the Baltimore and Ohio for April were \$369,077, against \$485,896 for 1858. The earnings of the Michigan Central, for the first week in May, were \$28,646, against \$46,256. Those of the Pittsburg, Fort Wayne and Chicago were \$20,125 for the week ending May 14th.

The exports of specie from Jan. 1st to the 14th inst. were \$23,552,203. The comparative exports for the three years past is as follows:

1857.	1858.	1859.
\$27,932,080	\$22,116,636	\$23,552,203

The prices for the week of the leading securities in the market have been as follows:

	May 13.	14.	16.	17.	18.
Missouri 6s.....	83½	84½	84½	84½	83½
Del. and Hud.....	95	96	95½	..	94
Pacific Mail.....	85	82½	80½	83½	85
N. Y. Central.....	75½	73½	72½	72½	72½
Hudson River.....	31½	31½	31½	..	31½
Panama.....	118½	118½	117½	118	117
Harlem Pref.....	36	37	36½	36½	..
Reading.....	46½	47	45½	45½	45½
Michigan Southern... ..	9	10	9½	10	..
" Pref.....	30½	32½	31½	32½	31½
" Central.....	41	42½	41½	42½	42
Ill. Central shares....	..	57	..	57	55
" 7s.....	81	81½	80½	79½	80
Gal. and Chicago.....	61½	63½	62½	44½	64
Cleve. and Toledo....	26½	26½	..	27	27
Chi. and Rock Island..	60	62	..	63	62
Tennessee 6s.....	91½	91	91½	91	91
Virginia 6s.....	94½	95	94½	95	94½

The Currency.—Report of Messrs. Opdyke, Gallatin and Others.

We have read with attention, and have tried hard, but we fear in vain, to penetrate the meaning of many portions of the recent report submitted by George Opdyke, James Gallatin and other gentlemen, upon "the present degree of bank expansion," submitted to a meeting of the New York Board of Currency held in this city on the 16th instant. As everything that receives the sanction of this body, commands a certain degree of respect and influence, and as the parties signing the report are oracles, in their way, self-constituted, very probably, on the subject of banking and currency, we propose to examine their arguments, and to challenge some of the conclusions, which they, with so much confidence, claim to have established.

In the first place, not to follow the report in consecutive order, what is money?—meaning thereby not gold and silver, but bank bills, checks, and certificates of deposit. This question may be better answered, by stating the conditions or process, by which it arises or is created. A. B., the owner of a hundred barrels of flour, sells them to B. C., taking his note for their value, due in six months. A. B. takes this note to a *Bank*, which discounts it, or in other words, exchanges its own due bills for it; or gives him credit on its books for its value, less the rate of discount; or gives him a certificate that such a sum is subject to his order. The Bank thus substitutes its own credit for that of the purchaser of the flour, which the seller, in any of the forms supposed, uses as *money*. We will not here go one step further back to show why these credits of the Bank may be safely treated as money, in its strictest senses; i. e. as gold and silver, but only remark that they possess exactly the same value as gold and silver, as they represent an absolute value, to be replaced by an equivalent according to the terms of the note.

Now assuming that all transactions of the kind supposed are discounted at Banks, then the amount of Bank credits, or currency, or money, is always in direct ratio to the number of transfers of property that take place; or what comes to the same thing, the amount of property or fabrics produced. But all transfers of property are not upon credit, nor are all the credits given discounted at

Bank; but the amount of credits discounted has, probably, a very near ratio to the whole number of transfers that take place—which amounts to the same thing for this discussion, as if every transfer of property was followed by a discount at Bank.

The volume of currency, therefore, should have, and in fact, has a constant tendency to be in ratio to the value of fabrics created and sold. The abundance of one should keep pace with that of the other. The committee in their report adopt the arbitrary standard of population, as the proper measure of the amount of Bank credits, though by doing so they very soon find themselves in a dilemma from which they can only extricate themselves by the utterance of most absurd dogmas. Let us listen to these oracles—

"But it may be asked, why compare currency with population with the view of ascertaining its natural volume or normal condition? Why not compare it with commerce, whose instrument it is? The answer is obvious. Commerce in its largest sense—in the sense in which money is its instrument—includes every purchase and sale of all kinds of property. Taken in this sense, we have no statistics of commerce sufficiently comprehensive to serve the purpose of a comparison. Any attempt of this kind would be barren of useful results. But the results obtained by the comparison instituted in the foregoing table are believed to be perfectly reliable. *Commerce and population maintain uniform relations to each other; the growth of the one keeps pace with the progress of the other.* This is especially true of a country like the United States, where cheap and fertile land makes agriculture the leading interest, and where there is perfect exemption from every foreign influence calculated to change the habits and employment of the people. Our commerce, it is true, is alternately stimulated and depressed by bank expansions and contractions, but, if measured at its mean, its progress is believed to keep even pace with the march of population, and as commerce and money must necessarily maintain a uniform ratio, it follows that population and money must do the same, provided we take the average volume of money for a long period like that embraced in the table."

Let us see. In 1837, according to the table referred to, the deposits and circulation of all the Banks in the United States equalled \$276,583,076; the estimated population 15,663,597, which would give a ratio of \$17.61 of circulation and deposits for each individual. This ratio was largely reduced in subsequent years. In 1857, it had reached its highest ratio since 1837, viz, \$15.51. In reference to these fluctuations and the lessons they teach, we quote the following:

"In 1837, when the banks reached their highest degree of expansion, the ratio of money to population, was 17.61; in 1843 it was reduced to 6.14; which is little more than $\frac{1}{3}$ the ratio of 1837. In 1857 it had again increased to 15.51 and on the 1st January last, after having sunk the year previous to 11.55, it stood at 14.91, which is 25 per cent. above the average for the 26 years embraced in the table.

This feature of the table is also valuable as indicating the normal condition or natural volume of the currency. It appears that the mean quantity of currency furnished by the Banks of the U. States for the 26 years embraced in the table was \$11.92 to 1 of population. To this must be added the amount of coin in actual circulation, which is generally estimated to average about \$3 to each inhabitant, making, together, \$14.92, or, say, \$15 to 1 of population. *This, therefore, must be regarded as the quantity of money or currency that the commerce of this country requires; for money is an instrument of commerce. Its office is to measure the value of other things and transfer*

their ownership. *Commerce requires a specific quantity of money for this purpose. It requires an amount that will make the price of commodities correspond with their value.*

This point, (that is the requisite amount of money per head,) it is believed, has not hitherto been ascertained; but the above table shows it to be, for this country at least, about \$15 of currency to 1 of population."

Population, then is the only safe measure of the currency made up of bills in circulation and deposits. But, say our oracles, *commerce and money must maintain a uniform ratio.* Let us see where these two propositions which are unqualifiedly asserted, leave them.

In 1837, the internal commerce of the State of New York was carried on almost exclusively through its canals. Their total tonnage that year was 1,171,296. The value of this tonnage, \$55,809,288. The population of the State that year was, 2,200,000. In 1858, the tonnage of the canals had reached 3,665,192. Its value was, \$138,568,844. In the meantime the railroads of the State had been constructed. In 1858, the tonnage of these roads was 3,473,325, made up as follows:—

	Tons.
Products of the forest.....	303,236
Products of animals.....	734,995
Vegetable food.....	914,206
Other agricultural products.....	77,174
Manufactures.....	325,596
Merchandise.....	562,378
Other articles.....	556,140

Total tonnage..... 3,473,325

The value of this freight is estimated for us by one of the most experienced and competent forwarders in the State, as follows:—

	Value per ton.	Total.
Products of the forest.....	\$12	\$3,638,832
Do. animals.....	200	147,999,000
Vegetable food.....	50	45,710,300
Other agricultural products....	12	924,888
Merchandise and manufactures..	500	443,987,000
Other articles.....	5	2,780,700
Add value of canal freights....	..	138,568,844

Total.....\$783,609,564

This statement shows an increase in the internal trade of New York, from 1837 to 1858, a period of 21 years, of from \$55,809,288, to 783,609,564, which is at the rate of 1,500 per cent.! In the same period the population has increased from 2,200,000 to 3,676,000, or at the rate of 67 per cent. These are easily obtained and reliable data. It will not do to say that New York represents all the States, whose trade should be cited in illustration, instead of that of one State,—as the trade of New York has increased in less ratio than that for the whole country. In 1837, the tonnage coming to tide-water from the Western States, was 56,255 tons. In 1858, 1,273,099 tons, an increase of 2,000 per cent.! What then becomes of the dogma so confidently laid down by our oracles, that commerce and population always maintain uniform relations, and that, consequently, *money*, the representative of commerce, and population must do the same?

The commerce of a country must always be in ratio to its products. To create the present commerce of England, steam engines have been put to work, doing the labor of 300,000,000 men. Commerce there is not in ratio to population, but in ratio to the agencies that assist man in his

labors. With the steam engine, the productive capacity of a people may be increased twenty fold. The productive capacity of the people of the United States has been increased since 1837, more than five fold, by the means that science and invention have brought to their aid. In the meantime, our population has not doubled. For the committee to assert that commerce and population proceed in a similar ratio, is an absurdity which a school boy would be ashamed to utter. The commonest acquaintance with the progress of invention in labor saving machines, would teach one better. Were there no sufficient means in reach of the committee to show what the facts adduced by us prove, there might be some excuse. As it is, they are driven to a most absurd dogma, from an ignorance of the commonest principles of political science; and, in fact, from the want of the commonest reading and observation.

Another dogma of this committee is the following:

It is supposed by many that the large substitution of bank notes and inscriptions of credit for metallic money in this country, has permanently increased the volume of our currency. This opinion is believed to be erroneous. The engrafting of a paper money on a metallic base expands the currency for a season, and sometimes enormously, as the table proves; but, so long as it is redeemable in coin, it must meet the competition of metallic currency in other nations with which we trade, as otherwise it would lose the whole of its metallic base; and this can only be done by periodical reactions, which contract the currency as much below its mean volume as it had, in the first instance, been carried above it. It will be seen, by consulting the table, that for the 26 years embraced in it, the currency was below its mean 13 years, and above it for the same period.

This dogma is very easily disposed of. Suppose our currency to be entirely a metallic one. Assuming the same number of transactions as with a currency made of *credits*, then the country must invest some \$450,000,000 in gold and silver, to supply the place of bank credits; or, in other words, we must convert an equal amount of *productive* into *unproductive* property, (for gold and silver, as coin, are unproductive.) The available means of the country would be reduced in an equal degree. As our wealth is reduced, so the transfers of property are reduced in number or amount. By using a symbol instead of the substance, we are enabled to effect the greater part of the transfers of society without the interposition of actual values, which remain employed, or are exchanged for articles which, united with labor, are capable of reproduction.

Another erroneous notion put forth by the committee is, that a currency of credit is based upon *specie*. So far from this being the case, the two are entirely dissimilar. Were the various productive interests in the country in entire harmony, then no specie would be required in trade, save for *change*. Each person would contribute to, just as much as he took from, the general stock of merchandise. His contributions would be his title to receive a corresponding amount or value from the contributions of others. This is just the manner in which distribution between producers and consumers is now effected. Gold is a necessary agent when the purchaser has nothing else to offer. In the settlements made between the banks, the strongest may not by any means, be the one that has the largest amount of gold in its

vaults, but the one which has the largest amount of credits against other parties, representing articles of consumption produced and sold. If a bank or person has anything else to pay with, gold is not wanted—except, to be sure, in such cases where credits are for the time annihilated, and society for the moment lapses into an elemental condition. But we so recently elaborated this branch of the subject, that we forego further discussion of it at the present time.

We shall return to this subject in our next number.

Chicago, Burlington and Quincy Railroad.

The road of this company commences 30 miles west of Chicago, at its junction with the Galena road, and extends 138 miles to Galesburg, where it connects with the Quincy and Chicago Railroad for Quincy, and with the Peoria and Oquawka Railroad for Burlington and Oquawka. In addition to earnings upon its own road, the company receives 73 per cent. of the earnings upon 30 miles between Chicago and the junction, and in computing the earnings per mile 22 miles should be added, making the length of the road 160 miles.

Pittsburg, Ft. Wayne and Chicago R. R.

The annual meeting of this Company was held in Pittsburg on the 29th of March last, at which the second annual report of the directors for the fiscal year ending December 31, 1858, was submitted, together with the general statement from the Auditor, showing the pecuniary affairs of the Company at that date. The following is an abstract:

EARNINGS FOR 1858.			
Freight.	Passengers.	Mails.	Total.
Jan. 39,894.74	\$48,747.79	\$4,482.29	\$93,124.82
Feb. 47,170.03	40,542.64	4,482.29	92,194.96
Mar. 69,817.08	71,239.51	4,482.29	145,038.88
Apr. 68,987.57	69,806.31	4,482.29	133,076.17
May. 48,108.89	61,739.18	4,482.29	109,330.36
June 39,216.91	58,634.21	4,482.29	102,333.41
July. 48,786.76	48,885.55	4,482.29	101,654.60
Aug. 76,540.15	61,904.55	4,482.29	142,926.99
Sept. 81,597.80	81,392.38	4,482.29	167,471.97
Oct. 76,724.55	75,664.71	4,482.29	159,871.55
Nov. 58,453.59	62,853.26	4,482.29	125,789.14
Dec. 58,772.21	58,740.75	4,482.29	121,995.25
\$698,569.78	742,450.84	53,787.48	1,494,808.10
Rent of road, rents and miscellaneous	72,424.12		
Total earnings.....			\$1,567,232.22

EXPENSES.	
Repairs of machinery	\$193,903 33
Repairs of track and road-way	254,614 36
Repairs of bridges	22,152 22
Repairs of buildings	10,431 73
Station expenses	103,873 95
Fuel	91,814 06
Oil and waste	19,390 68
Train hands	140,966 36
Loss and damage	14,696 22
General superintendence	41,075 21
Miscellaneous	72,655 48
	965,573 60

Net earnings	\$601,658 62
Interest on bonds issued	\$563,868 75
" floating debt	84,676 40
Taxes for 1858	23,728 83
Discount, commiss'ns, etc	13,332 90
	\$685,596 88
Deficiency of net earnings to pay interest, etc., in 1858	\$83,938 26
Do. in 1857	54,751 69

Total deficiency Dec. 31, 1858...\$138,689 95
The allowance of one year's interest at 6 per

cent. to the shareholders, July 1, 1857, which was a charge to the net earnings for the first 17 months of the existence of this Company, and an increase of capital, being in excess of such net earnings, is the cause of the apparent deficiency to Dec. 31, 1857; that for 1858 seems to be the result in part of the diminished earnings, and the large amount paid as interest and discounts on the floating debt.

Compared with the previous year, the expenses show a decrease of.....\$103,117 73
The gross earnings a decrease of 93,192 67

And the net earnings an increase of.. \$9,925 06

The earnings from freight and miscellaneous items exceeded those of 1857 by \$45,380 23; while the decrease in passenger earnings was \$138,572 90.

The full paid shares of capital stock of the Company has been increased during the year \$39,400; and the scrip stock decreased \$9,204 09. The former is the result of the conversion of \$10,000 of scrip into full paid shares, and the allowance of interest on shares in the Ohio and Pennsylvania Railroad Company, held by Stark and Richland counties, O., to July 1, 1856, together with 20 per cent. premium on the same, and interest to July 1, 1857, amounting to \$11,750. The balance was issued to sundry parties in payment of labor done in construction, etc.

The bonded indebtedness of the Company has also been increased as follows:

Mortgage construction bonds.....	\$714,000
Real estate bonds.....	241,500
Bridge bonds of O. & P. R. R. Co.....	126,500
Sinking fund bonds issued to fund coupons due and maturing to April 1, 1859	576,765
	\$1,658,765

In the negotiation of these bonds, the Company has paid \$115,877 64 as discounts; of which \$29,850 was on \$126,500 of the bridge bonds of the Ohio and Pennsylvania Railroad Company, being at the rate of 23½ per cent.; \$55,089 24 on \$314,000 of the mortgage construction bonds of this Company, being at the rate of 17½ per cent.; and \$30,938 40 on \$166,500 of the real estate bonds of this Company, being at the rate of 24 per cent. Of the 1st mortgage construction bonds, \$400,000 were delivered to the Chief Engineer, together with \$75,000 of the real estate bonds, to be used in the extension of the road from Plymouth to Chicago.

Of the sinking fund bonds, amounting to \$716,415, there have been issued \$576,765—leaving still to be issued \$139,650. These bonds were created for the purpose of funding certain coupons of the bonds of the old companies, maturing during the past and part of the present year. The whole issue will fall due as follows: Jan. 1, 1863, \$314,475; Feb. 1, 1863, \$105,000; and April 1, 1863, \$296,940—including \$50,610 arranged to be issued for coupons of the Ft. W. & C. R. R. Co. Real Estate bonds.

Of the coupons of the bonds of the old companies, there have been \$3,150 converted into mortgage construction bonds, the parties preferring this course to that of taking the sinking fund bonds and converting them into the mortgage construction bonds, which the holders were entitled to do at 84 per cent.

Of the coupons of the Ft. W. & C. R. R. Co.

real estate bonds falling due April 1, and Oct. 1, 1858, and April 1, 1859, arrangements for the funding of which had been consummated, the company were obliged to pay in cash \$1,680, in consequence of one of the holders dissenting from the agreement made with the others.

The amount outstanding of the acceptances and notes of the company was \$972,287 12. Of this amount, \$356,218 78 was over due at the close of the year; \$427,114 43 mature during the year 1859; and the balance between Jan. 1, 1860, and Feb. 1, 1864. It will therefore be seen that the amount to be protected during the year, by payments or renewals, is \$783,333 31; if to this be added the notes of the old companies overdue, the warrants payable, matured, or maturing in 1859, unpaid construction and transportation accounts and other accounts payable, and coupons overdue, as given in the annexed statement, the result will show the sum of \$1,286,858 26 as the floating debt for which provision must be made during the present year.

The floating debt, which amounted in 1857 to \$1,951,875 14, has been reduced during the past year to \$1,657,594 46. In the above reduction of indebtedness is included \$21,150 60 of the obligations of the old companies, in the retirement of which \$18,576 50 was paid in cash, \$539 33 was funded, and the balance, \$2,034 78 was renewed by the issue of acceptances, and is included in the amount of their outstanding indebtedness.

The net decrease is as follows:

Bills payable of old companies.....	\$21,150 61
" " this company.....	399,704 37
Outstanding transportation accounts.....	61,703 26
Coupons due	46,743 60
	\$529,301 74

Less increase of—

Warrants payable	\$66,025 23
Construction accounts	79,997 56
Other accounts payable.....	88,998 27
	235,021 06

Net decrease in floating debt.....\$294,280 68

In the first report of the consolidated company for the 17 months ending Dec. 31, 1857, a statement was published showing the debts and assets, exclusive of the bonds and land, of the three several companies as far as ascertained. The increase in the construction accounts of these companies, since that date, amounting to \$44,028.51, consists of claims against those companies, assumed and paid by this company, of which no account was had prior to, but were part of their liabilities at the time of, the consolidation.

The net decrease in the notes and acceptances of this company is as follows:

Total amount retired.....	\$1,520,572 09
Of which were renewed.....	1,070,165 87

Leaving actually retired	\$550,406 22
Total amount issued.....	\$1,220,867 72
Renewals as above.....	1,070,165 87
	150,701 85

Net decrease

The increase in warrants outstanding is as follows:

Amount issued during the year.....	\$77,857 83
Less retired by cash payments, bonds, etc. 11,832 60	

Net increase

The increase in the construction accounts outstanding is as follows:

Vouchers audited and recorded.....\$489,734 10
 Less amount paid in cash..\$104,541 17
 Construction bonds..... 81,700 55
 Real Estate..... 118,625 00
 Bridge..... 3,814 44
 Acceptances..... 35,175 48
 Stock..... 13,864 65
 Transferred to sundry acts. 61,475 48
 Freight on iron credited to earnings, etc..... 40,539 47
 409,736 54

Net increase.....\$79,997 56

The decrease in transportation accounts may be stated as follows:

Vouchers audited and recorded....\$1,017,833 32
 Less paid in cash.....\$933,632 48
 Construction bonds.... 43,441 70
 Acceptances..... 23,670 30
 Warrants etc..... 78,792 10
 1,079,536 58

Net increase.....\$61,703 26

The increase in "other accounts payable" is stated as \$88,998 27.

The unpaid coupons due to Dec. 1, 1858, which were payable in cash, have decreased during the year \$46,743 50.

The increase in construction expenditures was \$496,954 64. The whole amount of such expenditures from Aug. 1, 1856, the date of the consolidation, to Dec. 31, 1858, was \$2,152,464 13, as follows:

	Eastern Division.	Western Division.
Office expenses.....	\$2,115 53	\$2,165 19
Engineering.....	9,169 82	26,419 17
Land, etc.....	225,208 28	57,702 34
Grading.....	99,199 67	473,081 01
Superstructure.....	36,695 31	164,101 65
Iron.....	20,076 28	209,291 84
Fences, etc.....	2,663 70	1,394 57
Ballasting.....	5,514 44	149,247 54
Machine shops.....	9,832 85	42,139 03
Machinery in do.....	7,606 20	15,873 98
Freight and pass. sta'ns.....	18,918 50	19,711 36
Wood and water do.....	19,885 01	3,046 28
Locomotives.....	257,391 63	1,385 48
Cars.....	204,011 34	
Alleghany Bridge.....	84,504 60	
Contingencies.....	2,562 75	14,687 63
	\$975,355 91	\$1,187,108 22

The materials on hand have been reduced from \$125,210 31, in 1857, to \$97,705 42—being a difference of \$27,504 89, consequent upon a closer management enforced in the purchase and use of such materials. The bills and accounts receivable have been reduced \$38,314 89; the uncollected revenue at stations \$29,589 98; and the cash *in transitu* from agents \$15,371 41. This amount is deemed as low as can be practicably attained.

The assets in the hands of the Chief Engineer and other general agents are to be expended as follows:

For the completion of the road.....\$649,356 63
 Int. and sinking fund of bridge bds. 3,549 02
 Payment of taxes in 1858..... 12,735 00
 Sundries..... 2,428 87
 \$668,069 52

The balance due from the late treasurer has been reduced from \$77,141 93, by the payment to this company by the assignees of this estate of \$7,560, to \$69,581 93. Of this amount it is estimated that about 20 per cent. more may be collected.

GENERAL FINANCIAL STATEMENT.

Capital stock.....\$6,260,555 16
 Bonded indebtedness, viz.:
 1st mort. O. & P. R.R., due July 1, '65 1,000,000 00
 2d " " " " Jan. 1, '66 750,000 00
 Income " " " " Ap'l 1, '73 1,991,000 00
 Bridge " " " " May 1, '76 199,500 00
 1st mort. O. & I. " " Feb. 1, '72 1,000,000 00
 2d " " " " Oct. 1, '73 380,000 00
 3d " " " " Sep. 1, '64 17,000 00
 1st " Ft. W. & C. " " July 1, '73 1,250,000 00
 Real estate " " " " Dec. 1, '66 498,000 00
 Mort. construction, " " Jan. 1, '87 1,097,000 00
 Real estate " " Dec. 1, '66 270,500 00
 Sinking fund " " Jan. 1, '63 274,050 00
 " " " " Feb. 1, '63 91,245 00
 " " " " Ap'l 1, '63 211,470 00
 Floating debt, viz.:
 Bills payable O. & P. R. R. Co..... 5,753 92
 " O. & I. " " 19,241 58
 " Ft. W. & C. " " 10,013 84
 " P. Ft. W. & C. " " 972,287 12
 Construction accounts payable..... 153,213 00
 Transportation " " 227,884 90
 Other " " 189,281 98
 Coupons part due..... 9,341 50
 Warrants payable..... 70,576 62
 Coupons due on and after Jan. 1, 1858, to be funded..... 94,080 00
 Due C. & P. R. R. Co. for rent of road to Jan. 25, 1859..... 4,258 06
 \$17,046,252 68

Cost of road, Aug. 1, 1856: Cr.
 Ohio and Pennsylvania.....\$6,079,971 23
 Ohio and Indiana..... 3,235,057 99
 Ft. Wayne and Chicago..... 1,757,515 46

Total.....\$11,072,544 68
 Balance of account, Aug. 1, 1856:
 With Ohio and Penn. Co..... 165,422 97
 " " Ind. " " 222,761 49
 " Ft. Wayne and Chicago..... 107,483 72

Total cost, Aug. 1, 1856.... 11,567,212 86
 Expenditures since:
 On Eastern division.....\$975,355 91
 " Western " " 1,187,108 22
 Discount on bonds:
 Pennsylvania R. R. Co.'s..... 2,975 00
 Bridge bonds of do..... 32,240 00
 Ft. W. and C. 1st mort..... 169,080 01
 P. Ft. W. and C. mort. con..... 125,187 71
 " " real estate..... 45,813 40
 Premium on stock:
 Of Ohio and Penn Co..... 530,813 75
 Of Ft. W. and C. Co..... 71,468 99

Total.....\$14,707,255 85
 Less proceeds of sale of locomotive engine, and depot grounds in Chic. 76,145 70

Total cost of road.....\$14,631,110 15
 Real Estate..... 971,604 89
 Stocks and b'ds of other companies 91,100 00
 Cash at N. Y. office..... 22,279 58
 Materials on hand..... 97,705 42
 Cash and cash items..... 103,073 90
 Assets in hands of Chief Eng. and other general agents..... 668,059 52
 Sundry accounts receivable, bad and doubtful..... 112,107 77
 Coupons due Jan. 1, 1859, funded in advance..... 193,165 00
 Do. paid in advance..... 17,356 50
 Bal. of income account..... 138,689 95
 \$17,046,252 68

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J. EDGAR THOMSON, *President.*
 T. HASKINS DUFUY, *Acting President.*
 JOSEPH K. EDGERTON, *Vice-President.*
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 T. D. MESSLER, *Auditor.*
 J. P. HENDERSON, *Treasurer.*
 AVO. BRADLEY, *Secretary.*

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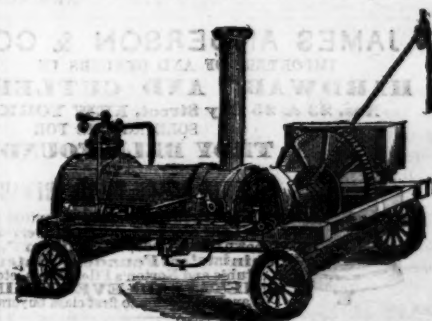
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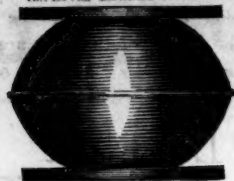
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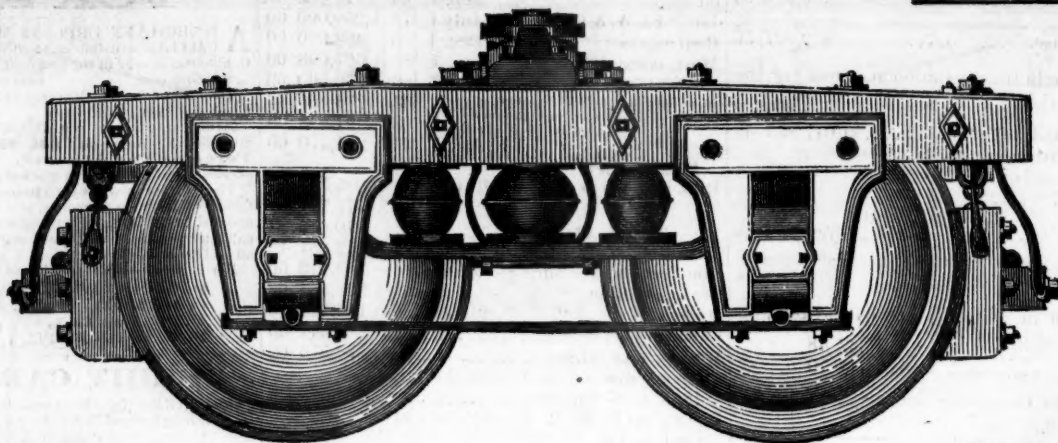
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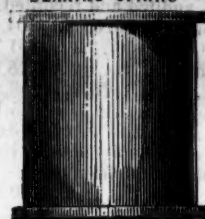
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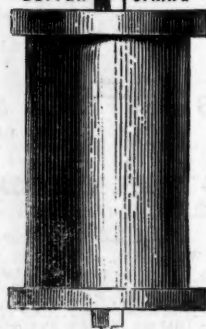
OF THE



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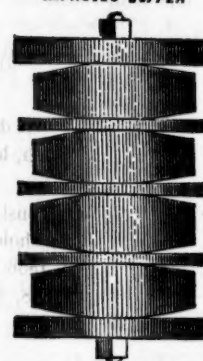


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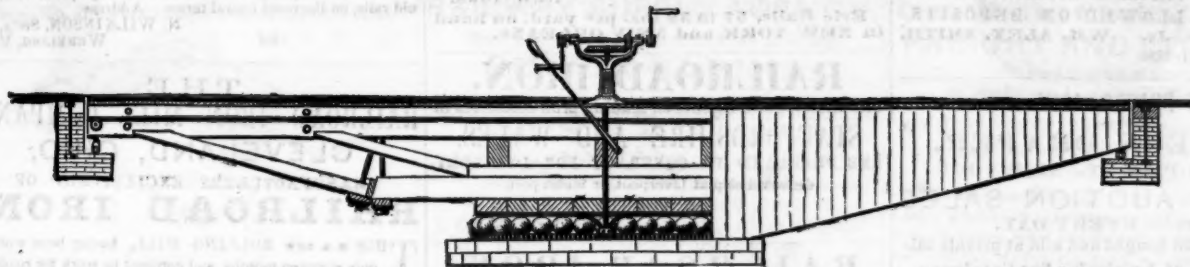
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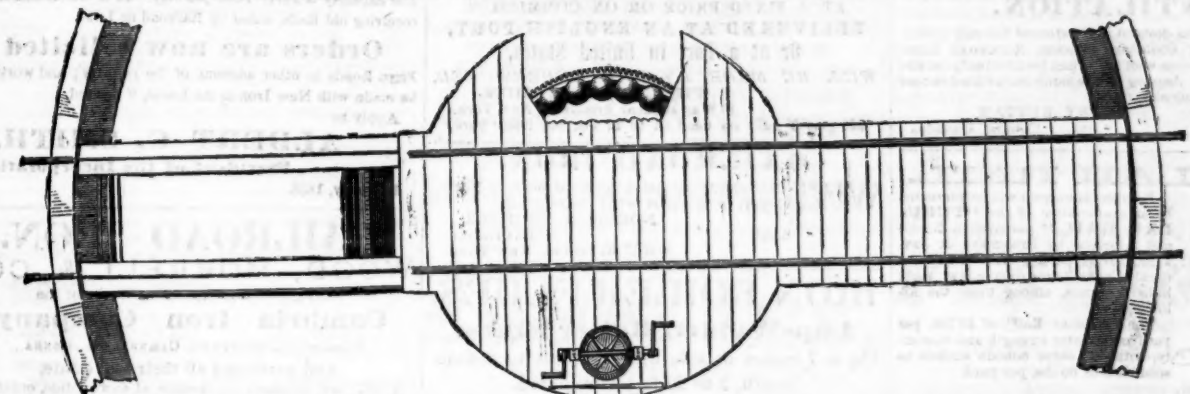
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THE subscriber is prepared to enter into CONTRACTS
 FOR RAILS delivered at an English port or at a port
 in the United States.

JAMES TINKER,
 54 Exchange Place,
 NEW YORK.

Eric Rails, 57 to 58 lbs. per yard, on hand
 in NEW YORK and NEW ORLEANS.

RAILROAD IRON.

The undersigned, Agents for leading Manufacturers in
 STAFFORDSHIRE AND WALES,
 ARE PREPARED TO CONTRACT FOR DELIVERY
 On board ship, at Liverpool, or Welsh port.
C. CONGREVE & SON,
 13 Cliff st., N. Y.

RAILROAD IRON.
 CONTRACTS FOR RAILS,
 AT A FIXED PRICE OR ON COMMISSION,
 DELIVERED AT AN ENGLISH PORT,
 Or at a Port in United States,
 WILL BE MADE BY THE UNDERSIGNED,
THEODORE DEHON,
 10 Wall st., near Broadway, New York.
 500 tons T rails on hand 54 to 57 lbs. per linear yard.

RAILROAD IRON.
 WELSH or Staffordshire make, delivered on board at an
 English port or at a port in the United States.
NORRIS & BROTHER,
 6m35 BALTIMORE.
 And 17 Nassau st., NEW YORK.

IRON BOILER FLUES.
 Lap-Welded Boiler Flues,
 1½ to 7 inches outside diameter, cut to definite
 length, 2 to 20 feet as required.
 Wrought Iron Welded Tubes,
 From 1½ to 5 inches bore, with Screw and Socket
 Connections. T's, L's, Stops, Valves, Flanges,
 &c., &c.

MANUFACTURED AND FOR SALE BY
MORRIS, TASKER & CO.,
PASCAL IRON WORKS.
 Established 1831.
 Warehouse—209 South Third st.,
PHILADELPHIA.

STEPHEN MORRIS, CHAS. WHEELER, JR.,
THOS. T. TASKER, JR. STEPHEN P. M. TASKER.

RAILROAD IRON.
 The Subscribers, Agents for the Manufacturers,
 ARE PREPARED TO CONTRACT FOR THE
 DELIVERY OF RAILROAD IRON AT ANY PORT
 in the United States or Canada, or at a shipping port in Wales.
WAINWRIGHT & TAPPAN,
 Boston, June, 1851. 29 Central Wharf.

MORRIS & JONES & CO.,
IRON MERCHANTS,
 MARKET AND SIXTEENTH STREETS,
PHILADELPHIA.
IRON AND STEEL
 IN ALL THEIR VARIETIES.
 BOILER PLATE, CAR AXLES,
 BOILER RIVETS, RAILROAD IRON,
 CUT NAILS and SPIKES, PIG IRON, &c.

Having the selling agency of a number of the Rolling Mills
 Furnaces and Forges in this State, orders for any description of
 Iron can be executed.
 August 16, 1854. 1v38

RAILROAD IRON.

THE subscribers are prepared to contract for RAILS
 delivered at an English port or at a port in the United
 States. Also for all descriptions of

RAILROAD EQUIPMENTS
 upon favorable terms.
JOHN W. HULL & CO.,
 No. 41 Exchange Place, NEW YORK.

RAILROAD IRON.

The Crescent Manufacturing Company,
WHEELING, VA.,
 ARE now prepared to execute, at short notice, orders for
 Rails of any required pattern and weight, and to re-roll
 old rails, on the most liberal terms. Address
N. WILKINSON, Sec'y,
 8th WHEELING, VA.

THE
RAILROAD IRON MILL COMPANY,
CLEVELAND, OHIO,
 MANUFACTURERS EXCLUSIVELY OF
RAILROAD IRON.

THIS is a new ROLLING MILL, having been working
 only eighteen months, and confined to work for roads on
 this line between Buffalo and Chicago in re-rolling old Rails.
 The capacity is Forty Tons per day. It is well situated for
 receiving old Rails, either by Railroad or Lake.

Orders are now solicited
 From Roads in other sections of the country; and work will
 be made with New Iron in the heads, if desired.
 Apply to

ALBERT G. SMITH,
 President of the Incorporation.
 February, 1858.

RAILROAD IRON.
WOOD, MORRELL & CO.,
 Having leased the extensive Works of the
Cambria Iron Company,
 Situated at JOHNSTOWN, CAMBRIA CO., PENNA.,
 And purchased all their real estate,
 ARE now prepared to execute, at short notice, orders for
 RAILS of any required pattern or weight, on the most
 liberal terms.
 Philadelphia Office, North Penna. R. R. Building,
 No. 407 Walnut st.

THE
ROUND OAK IRON WORKS,
STAFFORDSHIRE, ENGLAND.
 Lord WARD, Proprietor.
MANUFACTURE RAILS, BOILER PLATES,
SHEETS, HOOPS and BARS, of every variety
 of pattern.
NORRIS & BROTHER,
 Agents for the United States,
 12 SOUTH CHARLES STREET,
 BALTIMORE.
 6m35 And 17 NASSAU STREET, NEW YORK.

RAILROAD IRON.
THE RENSSELAER IRON COMPANY,
TROY, N. Y.

OFFER Rails of their own manufacture deliverable as may
 be desired by purchasers.

OLD RAILS
 received in exchange for new, or for re-manufacturing.
JOHN A. GRISWOLD, Agent,
 TROY, N. Y.
 New York Agency:
BUSSING, CROCKER & DODGE,
 39 Cliff St.

LACKAWANNA
IRON AND COAL COMPANY,
SCRANTON, LUZERNE CO., PA.

BY the completion of the Delaware, Lackawanna and
 Western Railroad, this Company are enabled to obtain
 the Magnetic Ores from the most celebrated mines in New
 Jersey, which used in combination with their native ores, pro-
 duce a quality of iron not surpassed.

These works have been greatly enlarged the past year, and
 are, therefore, prepared to execute orders promptly for
 RAILROAD IRON of any pattern and weight, Car Axles,
 spikes, and Merchant Iron. They have on hand patterns for:
 T rails, of the following weights per linear yard, viz:—25, 30,
 35, 40, 45, 50, 60, 62, and 75 lbs.

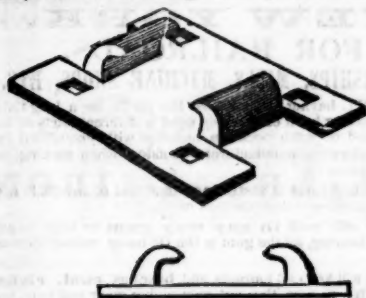
Sample of Rails and Merchant Iron may be seen at the
 Office of the Company, 46 Exchange Place, New York.
 Address **J. H. SCHANTON, President,**
 SCRANTON, PA.
 or **THEO. STURGES, Treasurer,**
 46 Exchange Place,
 New York.

**NEW YORK
RAILROAD CHAIR WORKS.****J. B. GREEN & CO., Proprietors.**

SUCCESSORS TO THE

New York Wrought Iron Railroad Chair Company.

Office, No. 51 Exchange Place, New York.



HAVING recently purchased, at Receiver's Sale, all the Patent Rights owned by the late New York Wrought Iron Railroad Chair Company, and also the entire machinery for manufacturing their improved Wrought Iron Railroad Chair, we are now fully prepared to receive and fill all orders from responsible parties, to any extent, with promptness and dispatch.

The thickness of the lips of our Chair increases through the bend, where the greatest strength is required, and diminishes towards the edge; so that a less weight of metal may be used, and a strength acquired equal, if not superior, to that of a heavier Chair of uniform thickness.

We invite the attention of parties wishing the best Wrought Iron Chair now in market, to our works for a supply; believing they combine qualities superior to any others now manufactured.

The Chairs weigh from seven and a-half to fifteen pounds, according to the thickness of the Iron and size of the Chair. To enable us to give you a perfect fit, it will be necessary always to send a section of the Rail. We cannot undertake to make Chairs without a proper pattern, as it is impossible to make a perfect fitting Chair from a drawing.

Our manufacture of Chairs are used on a large number of Roads, of which the following list comprises some of them, viz

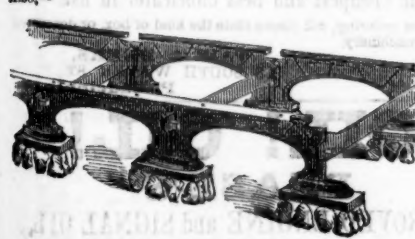
Galena and Chicago Union Railroad Company,
North Carolina Railroad Company,
New Jersey Central Railroad Company,
Panama Railroad Company,
Buffalo and State Line Railroad Company,
New York and New Haven Railroad Company.

Messrs M. K. JESUP & CO., 44 Exchange Place, New York, are the only parties authorized to act as our Agents.

**BEERS'
CAST-IRON ENDLESS RAIL,
FOR CITY RAILROAD;**

Now being laid in Philadelphia and elsewhere;

THIS road is exclusively of cast iron, without tie, string-piece, or chair; Rail 85 to 100 lbs. per yard; Durability four fold over the present road; with 65 lbs. groove rail; And with a saving on first cost; effecting a reduction in current yearly repairs, and relays, of at least \$1,000 per mile.

**BEERS'
ELASTIC IRON RAILWAY,
FOR LOCOMOTIVE USE;**

This road can be built and equipped, without additional cost over a road with 56 lbs. T rail; saving not less than 60 per cent on motive power, 50 per cent on dead weight, and 80 per cent on repairs of way; thus reducing the yearly expenses from \$1,500, to \$2,000, per mile. For full particulars, with drawings, relating to both roads, see a recent Treatise, entitled "Railroads, their construction and management, with the results of twenty-five years experience," by S. A. BEERS, Civil Engineer, BROOKLYN, N. Y. Price 50 cts. Address the author.

The undersigned is prepared to construct, by contract, the above roads, in any part of the U. S. or Europe, at the shortest notice, being aided by a staff of contractors of the most extensive experience.

S. A. BEERS.

GEO. M. FREEMAN,

SUCCESSOR TO

PRATT & FREEMAN,

PHILADELPHIA

RAILWAY SUPPLY AGENCY,

No. 123 WALNUT STREET,

PHILADELPHIA.

Railroad Materials, Locomotive and Car Findings,

MACHINERY AND MACHINISTS' TOOLS,

MINERS' TOOLS, ETC.

COTTON WASTE, AT

WHITE AND YELLOW CAR GREASE,

LOCOMOTIVE BRASS WORK,

Baggage Checks, Barrows, etc., etc.,

RAILROAD LANTERNS, SIGNAL LIGHTS,

STEAM GAUGES, COCKS AND WHISTLES,

INDIA RUBBER HOSE PACKINGS, ETC.

LANTERNS OF ALL DESCRIPTIONS,

ENGINE, STATION, AND SIGNAL BELLS,

Superior Car Upholstery, etc.

AGENCY OF THE KEROSENE OIL COMPANY.

Orders solicited, promptly filled, and forwarded with despatch and care at the manufacturers' lowest prices.

HOLT, GILSON & CO.,

MANUFACTURERS AND DEALERS

IN

RAILROAD & STEAMBOAT

SUPPLIES,

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LOCOMOTIVES AND CARS.

Rails, Sleepers, Chairs, Spikes, Wheels, Axles and Tires.

BOILER TUBES AND FELTING.

BOLTS, NUTS & WASHERS.

CAR, SHIP AND BRIDGE BOLTS.

Locomotive, Hand and Ship Lanters; Car Trimmings of all descriptions. Steam and Water Gauges; Signal Bells, etc., etc.

AGENTS FOR CAR HEAD LININGS.

Sole Agents for TOMMY'S celebrated LARGE GLASSES, and PACKERS IMPROVED RATCHET DRILL.

Orders filled with despatch and at the lowest prices.

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GILBERT, MURDOCK & CO.,

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ARE agents for, and prepared to furnish at manufacturers' prices,

RAILROAD IRON,

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RAILROAD CARS,

CAR WHEELS,

AXLES, CHAIRS,

SPIKES, TOOLS,

ETC., ETC.

All inquiries in reference to the above articles will receive immediate attention.

New York, January, 1859.

S. B. BOWLES,

MANUFACTURER AND DEALER IN

RAILROAD

SUPPLIES,

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(Between PLATT and MAIDEN LANE.)

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No. 44 Water, between Congress and Kilby Streets,

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Iron Rails, Chairs, & Spikes,

FREIGHT AND COAL CARS,

(on hand or made at short notice.)

Wheels and Axles of all kinds,

LOWMOOR, AMES, BOWLING and NASHUA TIRES,

IRON AND STEEL,

Of all kinds for Shops and Tracks.

Car Trimmings, Paints, Oil, Varnish, Car and Switch

Locks, Ventilators, Lanterns, Head-Lights, Gauges, Rubber

Springs, Chairs, Hose and Belting, Ash, Pine and other Timber, and ALL MATERIALS USED in Equipment and Repairs of

Railroads, Engines and Cars, at lowest prices.

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Boston and Maine R. R.

Capt. Wm. H. SWIFT, Boston.

LAWRENCE STONE & Co. do.

S. M. FELTON, Pres't Phila. W. & B. R. R.

PHILIPS, DODGE & Co., N. Y.

COPPER, HEWITT & Co., do.

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A. BRIDGES & CO.,

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FINDINGS,

OF EVERY DESCRIPTION,

64 COURTLANDT ST., NEW YORK.

RAILROAD AXLES, WHEELS AND CHAIRS,

SPIKES, BOLTS,

NUTS, WASHERS,

CAR, SHIP AND BRIDGE BOLTS.

IRON FORGINGS OF VARIOUS KINDS, ETC., ETC.

STEEL AND RUBBER SPRINGS,

LOCOMOTIVE AND HAND LANTERNS,

PORTABLE FORGES AND JACK SCREWS,

COTTON DUCK FOR CAR COVERS,

BRASS AND SILVER TRIMMINGS.

Also, Sole Agents for the Manufacturers of Car Head Linings.

Orders for the purchase of goods on commission, aside from our regular business, respectfully solicited.

ALBERT BRIDGES. JOEL C. LANE.

MORRIS R. JESUP, JOHN KENNEDY, GEORGE A. SMITH.

M. K. JESUP & CO.,

RAILWAY AGENTS AND BANKERS,

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AGENTS FOR THE SALE OF

FOREIGN AND AMERICAN RAILROAD IRON

AND ALL MATERIALS NECESSARY FOR THE

Construction, Equipment & Operating of Railways.

RAILWAY AND OTHER SECURITIES

BOUGHT AND SOLD

Either privately or at the Board of Brokers.

A. S. & A. G. WHITON

32 PINE ST., NEW YORK,

DEALERS IN

RAILROAD IRON,

CHAIRS AND SPIKES,

LOCOMOTIVES,

PASSENGER AND FREIGHT CARS.

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FOR the Iron Turn Tables, Directors' Patent Blower,

Gardiner's Voluto Car Springs and

RAILWAY SUPPLIES GENERALLY.

ALSO

NEGOTIATORS OF SECURITIES

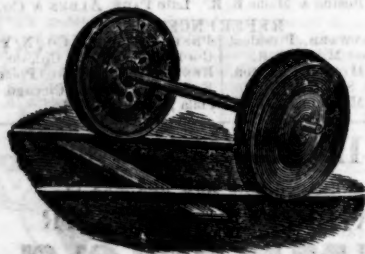
Railroad Iron.

THE undersigned have American and Foreign Railroad Iron for sale, deliverable in New York and other parts.
CASWELL & PERKINS,
 Brokers, 69 Wall st.
 New York, January 1, 1869.

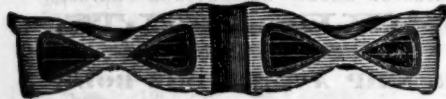
Boston Locomotive Works,
 Late Hinkley & Drury,
 No. 380 HARRISON AVENUE,
BOSTON.

LOCOMOTIVE AND STATIONARY
STEAM ENGINES;
BOILERS;
 Iron, Brass, Copper and Composition Castings;
COPPERSMITH'S WORK,
 AND ALL KINDS OF RAILROAD MACHINERY
FURNISHED AT SHORT NOTICE.

ALSO



**VAN KURAN'S IMPROVED
 RAILROAD WHEEL,**
 PATENTED MAY 1, 1849.
 Manufactured under the Personal Superintendence
 of the PATENTEE, as above.



ORDERS for any quantity of Wheels executed with dispatch, and Wheels and Axles fitted in the very best manner, and at the lowest rates.

Address **DANIEL F. CHILD,**
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**THE JERSEY CITY
 LOCOMOTIVE WORKS,**

SUCCESSORS TO

**BREESE, KNEELAND & CO.,
 JERSEY CITY, N. J.**

MANUFACTURE COAL or WOOD BURNING
 LOCOMOTIVES, Steam Fire Engines,
 Portable ENGINES and BOILERS, Cast Steel
 SPRINGS for Engines, Tenders, Passenger or Freight
 Cars; SHAFTING and ALL KINDS OF RAIL-
 WAY MACHINERY.

They also furnish to order TYRES, DRIVING WHEELS
 and AXLES, CASTINGS and FORGINGS.

Boiler Work furnished with dispatch.

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 OFFICE IN NEW YORK—49 WILLIAM ST.

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POOLE & HUNT,

Iron Founders and General Machinists,

ARE prepared to fill at short notice and of best materials
 and workmanship, orders for

Steam Engines of any Size.

PLATE CAR WHEELS and CHILLED TYRES, equal
 to any produced in the country.

WHEELS AND AXLES fitted for use.
 HYDRAULIC PRESSES for expressing Oils and for
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MACHINERY of the most approved construction for Flour-
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GAS HOLDERS of any size, and Machinery and Castings
 of all kinds for Gas Works.

STEAM BOILERS and WATER TANKS of any size or
 description. SHAFTING, PULLEYS and HANGERS.

**THE ROGERS
 Locomotive & Machine
 WORKS,**

SUCCESSORS TO

ROGERS, KETCHUM & GROSVENOR,

PATERSON, N. J.,

HAVING extensive facilities, are now prepared to furnish
 promptly of the best and most improved description, either
 COAL or WOOD BURNING

LOCOMOTIVE ENGINES

AND OTHER VARIETIES OF

RAILROAD MACHINERY.

J. S. ROGERS, Pres't, { **PATERSON, N. J.**
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M. K. JESUP, Vice Pres't.
L. P. STARR, Sec'y and Treas'r.
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Locomotive Engines.

**DANFORTH, COOK & CO.,
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HAVING erected an extensive Shop, with the most ap-
 proved Machinery and Tools, are prepared to execute
 orders for the various classes of Freight and Passenger Loco-
 motive Engines and Tenders, in the best manner and on the
 most favorable terms.

Also, Stationary Engines, and the various Tools suitable for
 furnishing Repair Shops.

The business of Machine making, heretofore carried on by
 Charles Danforth & Co., is continued by the present firm, and
 all orders will receive prompt attention. 1849

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 LOCOMOTIVE WORKS,**

SCHENECTADY, N. Y.,

HAVING large facilities, are prepared to receive and ex-
 ecute orders for

LOCOMOTIVE ENGINES AND TENDERS,

either for burning WOOD or COAL, with promptness and
 dispatch.

BRASS and IRON CASTINGS; LOCOMOTIVE TYRES
 welded and blocked to exact sizes, and every thing connected
 with the building or repairing of Locomotives furnished on
 short notice.

These Works being located on the New York Central Rail-
 road, near the centre of the State, possess superior facilities
 for forwarding their work to any part of the country, without
 delay.

JOHN ELLIS, Agent.

WALTER McQUEEN, Superintendent.

**RICHARD NORRIS. HENRY LATIMER NORRIS.
 RICHARD NORRIS & SON,**

LOCOMOTIVE STEAM ENGINE

BUILDERS,

SEVENTEENTH STREET, ABOVE CALLOWHILL,

PHILADELPHIA,

ENGAGED EXCLUSIVELY IN THE MANUFACTURE OF

LOCOMOTIVES,

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MACHINERY.

MANUFACTURE to order, Locomotives of any Arrange-
 ment, Weight or Capacity. In Design, Material and
 Workmanship, the Locomotives produced at these Works,
 are equal to, and not excelled by any.

WEST POINT FOUNDRY.

R. P. PARROT, Lessee.

Manufacturer of Marine and Stationary

ENGINES,

Sugar Mills, Saw Mills, Iron Bridges, Cannon,
 WATER PIPES, BOILERS, IRON BUILDINGS,
 CASTINGS & FORGINGS OF ALL KINDS.

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**REFINED NEAT'S FOOT OIL
 WARRANTED NOT TO GUM**

AND equal in every respect to the best SPERM OIL for all
 kinds of machinery use.

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**THE IMPERIAL
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MANUFACTURED BY

J. C. HULL & SONS,

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108, 110, 112, 114, 116 and 118 CHURCH ST.,

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FOR RAILROADS,

STEAMSHIPS, MILLS, MACHINE SHOPS, ETC.

THIS OIL, having been before the public for a long time,
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 country, and on each occasion meeting with unqualified ap-
 proval, renders the manufacturers confident when making the
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1st. Its first cost is vastly less than that of any Oil in use,
 of known merit or acknowledged worth.

2nd. It will not in any way gum or clog up any
 journal or bearing, all the gum in the Oil being entirely decom-
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3rd. It will keep all journals and bearings cool, clean
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 saving also no inconsiderable amount of motive
 power.

4th. It is fully as durable as any Oil in the market, and
 consumers are invited to make their experiments on such jour-
 nals as are inclined to heat up.

5th. It is sweet and clean, and entirely free from all
 odor or unpleasant smell.

Also,

**J. C. HULL & SONS'
 REFINED BURNING OIL.**

Buyers are requested to give this OIL a trial, as it is be-
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**CHEAPEST, CLEANEST AND BEST
 OIL FOR BURNING,**

(all things considered), in the market.

CERTIFICATES from a large number of Railroad
 and Steamboat officers, also, prominent Manufacturers
 and Machine Builders, can be seen by application as above.

TAW & BEERS,

DEALERS IN

Sperm, Whale and Elephant Oils,

Adamantine Car and other Candles,

AND MANUFACTURERS OF

**TAW'S LUBRICATING
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**FOR RAILROAD CARS
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THIS celebrated GREASE has been in use upwards of
 Ten years; and is in the opinion of FORTY RAIL-
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The Cheapest and Best Lubricator in use.

Parties ordering, will please state the kind of box, or descrip-
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OIL! OIL!

PEASE'S

IMPROVED ENGINE and SIGNAL OIL,

FOR

RAILROADS, STEAMERS, PROPELLERS,

AND FOR EVERY CLASS OF

MACHINERY AND BURNING.

PRACTICAL TESTS, by Engineers and Machinists of
 Thousands of Gallons, prove this Oil to be superior
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 durable than Sperm Oil, for Lubricating, and the only Oil
 that is in all cases reliable, that will keep bearings cool,
 and

WILL NOT GUM

In no case has it failed to meet the approval of the consumer.
 The Scientific American and Manufacturer's Journal, after
 testing this Oil, pronounce it superior to any other for Lu-
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F. S. PEASE, 61 Main st., BUFFALO.

Reliable orders filled for any part of the United States or
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